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PC HOW-TO GUIDE

Summer 2014

30+ POWERFUL PC PROJECTS!

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Secure your PC from attackers PG. 8

Investigate system hang-ups PG. 56

Benchmark your rig PG. 70

Stay anonymous online PG. 84



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Josh
Norem

POWER IS USELESS WITHOUT KNOWLEDGE

EVEN THOUGH *Maximum PC's* official tagline is "Minimum BS," there's also an unofficial tagline, sort of like that secret menu at In-N-Out. Call it the old-school tagline, or maybe even the secret handshake, but it is a simple three-word phrase that describes what we're all about, and it's simply "Pure PC Power." We love fancy cases and tricked-out mods as much as the next guy at the LAN party, but what really gets our motor running is the Powell Doctrine for PCs, which mandates overwhelming force in all scenarios. We want as many cores as we can have, all clocked as high as their cooling will allow. The same goes for GPUs, SSDs, and so on. We will never apologize for our ravenous appetite for power, because in this world of insane PC workloads, 4K gaming and video, "enough" power is a statement that isn't in our vocabulary. Just saying, "I think this PC is powerful enough" in the office is grounds for termination, according to our HR policy.

This ethos is embodied in every issue of *Maximum PC*, as we have always steadfastly remained committed to providing coverage of PC hardware, despite the persistent cries about how the "PC is dead" and that your tablet or smartphone is going to take its place (don't even get us started on that one). However, in addition to all the "hardware porn" we display each month and all the talk about Pure PC Power, there's another side to our coverage that often gets overlooked, and that's

our focus on education.

You see, in addition to all that lust-worthy gear, each issue of *Maximum PC* has an entire section devoted to education and learning what to do with all that power you've amassed; we call the section "R&D." It has how-tos ranging from simple to complex, walkthroughs of various PC builds, and more. That's in addition to educational features like the first one you'll find in this issue—how to protect and defend your PC. We think building or acquiring a powerful PC is just the first step in the process of becoming a power user. Anyone can buy or learn how to build a top-shelf rig, but knowing what to do with it is what is truly enjoyable, and what sets you apart from the newbs online who think they're hardcore because they hacked their smartphone.

This issue is a collection of a lot of the knowledge we've handed down over the past year or so, and has over 30 how-tos in addition to three features that cover security, mobile PC repair, and programming. The how-tos cover a wide array of topics, and I'm sure you'll find all of them easy to read and to implement. If you just read a dozen of them, you'll be on your way to joining the PC Master Race in no time.

Josh Norem is a contributing editor at Maximum PC magazine, as well as a professional photographer.

submit your questions to: comments@maximumpc.com

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GV-N78TGHZ-3GD 3072 MB/ 384 bit GDDR5

- NEW WINDFORCE 3X 2 Slot 450W fan sink with "Triangle Cool"
- Core/Mem clock: 1085 MHz (std 876) / 7000 MHz
- Boost Clock: 1150 MHz (std 928)
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Protect AND Defend

For every freedom and convenience we enjoy in our digital lives, there are countless cyber do-badders looking for ways to exploit them. Fight back with these 32 ways to protect your digital life!

BY THE MAXIMUMPC STAFF

Mark. Sucker. Victim. Yeah, that's you viewed through the monitor of a cybercrook sitting somewhere in A-holevania or Trashcanistan.

Call us cynical or hard-edged, but we frankly believe that the world is filled with hustlers, grifters, and crooks out to bamboozle us at every turn.

Those suspicions are doubled for our digital lives. For no longer do bunko artists need to trick you into buying that iPad box with a brick in it. Today, they can rip you off by auto pilot. With the deadliness and stealth of a UAV, these scumbags can steal your banking credentials, clone your debit card, or infect your computer.

Scared yet? Good. Fear is one of best motivators to getting people off of their lazy butts. It's not all about fear, though. It's also about information. Knowledge that can empower you and help you mount an effective defense against the multipronged attacks we all face today. Do you know how to thoroughly fortify your PC and network against enemy infiltration? How about your smartphone? Can you spot an ATM skimmer? What other potential threats should you be aware of? We'll give you all of the deets, along with the opinions of two security experts.

Don't worry about being too paranoid. From what we learned in the course of writing this story, there's really no such thing as being overly vigilant when it comes to your digital security.



Protect Your Desktop PC



Installing strong, up-to-date security software is a given. But it takes much more than that to defend the epicenter of your digital life

Keep Your OS Patched

Could real people actually be as clueless as some of those characters we see in movies? Sadly, you need no more evidence of that cliché than the average computer user. Even though he or she knows that an OS update is as critical as, say, nailing boards over your windows in a zombie apocalypse, many choose to ignore the updates until something crawls in and eats their brains.

The most basic security step PC users should take—regardless of OS—is to install the latest updates. Yes, we know, it can be teeth-gritting—especially when the updates are larger than the original OS—but it's necessary for patching holes being used by attackers to squeeze into your PC.

Lose Windows XP

Windows XP was a great operating system but it's now over 10 years old and it's a popu-

lar target for attacks. Why? It's not as secure as its replacements. It's also where the money is—literally—with 51 percent of computers on the *planet* running it. Many attacks specifically target XP and ignore Windows 7 and 8 completely. Unless you like to wrench on your OS all day, we recommend that you give XP the retirement it has earned.

Keep Your Applications Patched

Even Microsoft haters have to admit the company has done an admirable job patching its operating systems in a reasonable amount of time. Because of this, many of the weak spots on a PC aren't even the OS anymore, but rather the third-party applications. While Microsoft will patch its own products in Windows Update, it doesn't do squat about anything else. With literally dozens of apps to check for updates every week, you can see where the problem lies. That's why we run Secunia's PSI Scanner (www.secunia.com). The free app runs in the background and checks your installed apps and plugins for available updates and then gives you a link of where to download the patch. The latest beta version will actually install some of the updates for you. The company also offers an online scanner but we don't recommend it because it runs in Java.

Beware the Usual Suspects

When a massive malware outbreak occurs, you can almost always expect to see these five shifty guys in the police lineup: Flash, Acrobat/Reader, QuickTime, Java, and JavaScript.

Normally we'd say just execute 'em, but it doesn't always work that way. Yes, if you can, simply uninstall these offenders (save JavaScript), but if you must have them, there is a way to at least mitigate some of the damage.

Start by disabling Acrobat/Reader in your



Secunia's free PSI app will monitor the dozens of applications installed on your machine for available security patches.

browser. In Firefox, go to Tools, then Add-ons, then Plugins, and disable the Acrobat plugin. While you're there, you should also probably disable QuickTime, Java, and even the DivX Web Player if you want to be extra cautious.

To disable these plugins in Chrome, go to Options, Under the Hood, Content Settings, Plugins, and select "Disable individual plugins."

Now, go into the Acrobat app, go to Edit, Preferences, Trust Manager, and uncheck "Allow opening of non-PDF file attachments with external applications." While you're in Preferences, click the JavaScript option and uncheck "Enable Acrobat JavaScript." Also click on Internet and uncheck "Display PDF in browser." Or just dump the whole thing for Foxit Reader (www.foxitsoftware.com).

For QuickTime, start the player, dig into Edit, Preferences, QuickTime Preferences, Browser, and uncheck "Play movies automatically."

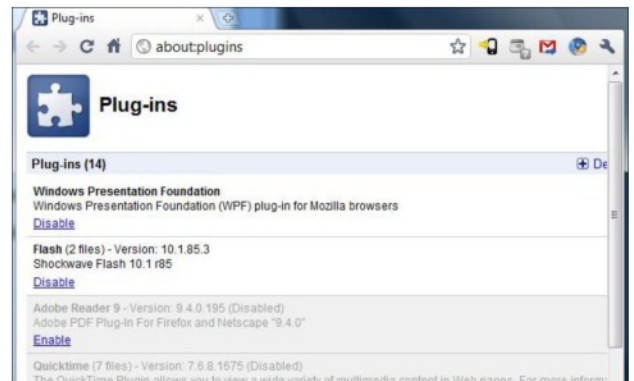
To mitigate the damages from Adobe Flash, consider running the FlashBlock extension in Firefox and Chrome. This will prevent Flash from being displayed on a page. In its place will be a place holder that, when clicked, will play the Flash content.

Disabling JavaScript unilaterally can be problematic, as it breaks many sites. Still, for the paranoid, there is a way. The NoScript extension for Firefox is the leading contender. Chrome has no such extension, but you can go to Tools, then Options, then Content Settings, then

JavaScript, and select "Do not allow any site to run JavaScript." This will place a small icon in the address bar that will let only your favorite sites run JavaScript. Disabling JavaScript in Chrome can be wonky, but it's worth investigating if you want to avoid one of the primary ways crooks are targeting you.

Use a Virtualized Browser

Since the vast majority of attacks are coming from the browser, one of the safest ways to surf the web is from a virtualized browser or a virtual machine. One of the simplest ways to accomplish this task is to build a virtual machine using either Virtual PC 2007 (www.microsoft.com) or VM Ware Player (www.vmware.com). Both are free, and both Microsoft and VM Ware offer free images that include browsers. Microsoft offers Vista and XP with IE8 installed and VM Ware offers Ubuntu with Firefox installed. Of the three options, VM Ware's is the most solid but folks not used to Linux might be thrown for a loop. Microsoft's images time out after three months, so you'll have to download it again.



Disabling plugins for Acrobat, QuickTime, and other media players can mitigate some of the damage from new zero-day exploits.

Get a Second Opinion

Do you really know if that file is truly untainted? Many malware writers are specifically crafting wares to avoid detection by antivirus suites. If you have a file that you need to run, we recommend that you incubate it for a few days or a few weeks if possible. This gives security software a chance to catch up to any new exploit. We then recommend that you get a second opinion from Virustotal.com. This website lets you upload a file to be scanned by two dozen AV engines. Just remember that malware writers are also using tools such as Virustotal.com to see if their wares can pass muster, so long incubations are key.

PHYSICAL SECURITY

Put Your Laptop on Lockdown

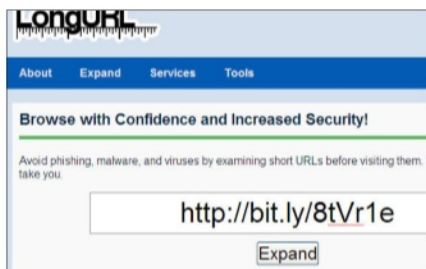
Obviously, all the same security risks and safety recommendations that apply to your desktop computer also apply to your laptop. But your laptop carries the added risk of being stolen. And let's face it: If you haven't encrypted all your sensitive data or been diligent about backups, the loss of your laptop could be mighty painful. One way to prevent the potentially dire consequences is to use a laptop lock.

The vast majority of notebooks have a slot to accommodate a physical locking mechanism—it's usually designated by a padlock icon. The lock itself is attached to a reinforced cable which cannot be easily cut without the aid of a large and very noticeable set of bolt cutters. The cable is either bolted to the floor—in your office at work, for instance—or looped around a substantial or immovable object. Kensington is one of the biggest names in cable-lock



Kensington's new ClickSafe key lock makes it an easy one-step process to secure your laptop from snatch-and-grabs.

makers, and offers both combination and key locks, priced at \$25 and \$50, respectively.



Although many URL shortening services claim to scan for malware, it's probably best to lengthen those URLs before you click on them, using Longurlplease.com.

Unshorten Those URLs

Shortened URLs can conveniently turn unwieldy web address into bite-size morsels, but they can also disguise a link to a malware-ridden site. Though many of the URL shortening services check for malicious websites, it's usually better to verify a shortened URL's destination. For that, we use Longurlplease.com. It supports 81 shortening services. As for cryptic shortened URLs, visit Virustotal.com to have the address checked by six URL analysis engines.

Run in a Standard User Account

Running as an administrator in a Windows OS is a bit like giving someone the right to walk into your home and rummage through every nook and cranny. One easy way to avoid or greatly limit damage from malware is to always run with standard user

rights. As with all things, this is no guarantee against harm. Some malware, even when executed in a standard user account, can grant itself administrator privileges and still run rampant through your PC, but running as a standard user minimizes risk.

Use a Live CD/Linux Distro to Do Banking

That Windows is the number one target for cybercrime and mischief is not news to any of us—naturally, owning 95 percent of the market makes it an obvious target. That's why we agree with security journalist Brian Krebs (<http://krebsonsecurity.com>) that members of the most at-risk group should do online banking with a Linux Live CD. You can do your gaming and other Windows-based computing booted from your hard drive. But once you have to go into secure mode, whip out your Live CD and boot to it.

Numerous Linux builds are available, but the most popular, and among the easiest, is Ubuntu.

Restrict PC Access for Others

So, you've created this incredibly secure moat, ringed with razor wire, claymores, and mines. And then you let your 14-year-old nephew play some Flash games or "check email." Right. The best solution is to have visitors use a separate, secured guest PC. But if they must use your machine, make sure you have the guest account activated. Another option is to have them use a virtual machine. Once they're done, simply shut down the VM and erase any trace of their activities. Or have them use your HTPC, where they're working in the open instead of being left alone in your office.



Running in standard user mode in a Windows OS has proven to be useful in beating back malware attacks.

HOW IT WORKS

Anatomy of a Drive-by Download

You think you're immune to harm because you don't go to piracy or porn sites, right? But putting all your faith in Goody Two Shoes browsing is like whistling past a graveyard. Like commercial fishermen, crooks are casting bigger nets to catch as many fish as possible. Here's how they do it.

1 Crooks discover a new zero-day exploit using Adobe Flash, Adobe Reader, Oracle Java, Apple QuickTime, JavaScript, or the browser itself.

2 The crooks then hack into an advertising server or a web page to place the code. In some cases,

the crooks masquerade as legit advertisers and buy time on mainstream websites. These ads, in turn, are actually hosted by the crooks' servers to keep the company running the ads from knowing they're tainted.

3 Users browsing the legitimate website receive the bad Flash

or JavaScript, which then secretly installs a trojan on their PC.

4 The trojan then contacts another server that is controlled by the crooks and receives instructions on what to do.

Smartphone Security



It's a lot smaller than your desktop PC, but the risks are just as big

Hang on Tight

Currently, the number one threat to smartphone users is having the device end up in the wrong hands, through theft or loss. Your first line of defense, therefore, is constant vigilance regarding your smartphone's whereabouts.

Use a Password and Encryption

Should your phone get lost or stolen, a good first layer of protection is a password, an option many phone users neglect. Choose the strongest password option available—a passphrase, for instance, rather than a four-digit code or swipe pattern. Encryption options vary among mobile OSes, but when possible, you should encrypt your storage card as well as your device memory.

Back Up Your Data

Just as with a PC, backing up your smartphone is important. Regularly synching the device to a linked computer will do the trick. It's insurance against the loss of your phone, corruption of your OS, or any other event that jeopardizes your data.

Don't Store Sensitive Data

The surest way to guard your sensitive data is to keep it off your smartphone altogether. Minimize the number and/or days of emails you store on your phone, or better yet, save email and attachments to a server. Make it a habit to regularly move or delete anything you wouldn't want to share with strangers.

Practice App Awareness

An abundance of apps is both a blessing and a curse for smartphones—there is no way every app that makes it to market can be thoroughly vetted for 100 percent fail-safe security. By selecting reputable apps, backed by favorable user reviews, from a trusted source, you can diminish the risks. Avoid apps with scant reviews or that have only recently been uploaded. Also be cautious when granting an app permissions; consider the app's function and what it might reasonably need access to.

Keep Software/Firmware Updated

Make sure you are running the latest versions of your apps, OS, and phone manufacturer software and firmware. This will ensure that any security holes are patched and your device is less vulnerable to hacks.

Disable Bluetooth and Wi-Fi When Not in Use

Unsecured wireless networks can be used by hackers to either attack your phone or steal information from it. You can protect yourself by keeping Wi-Fi and Bluetooth off when you don't need them. When wireless is needed, stick to known Wi-Fi networks using WPA2 and beware of public networks, which are sometimes set up by crooks to snare people's data.

When using Bluetooth, make sure it's in non-discoverable mode to avoid hacks like "Bluesnarfing" (stealing data), "Bluejacking" (sending unsolicited messages), and "Bluebugging" (listening in on your calls).

Beware of Links and Attachments

You've long been warned about the risks of opening strange links and attachments—particularly those arriving in unsolicited emails or text messages. All those same warnings apply to smartphones. And those warnings also apply to calling unfamiliar phone numbers received in messages, and clicking links for app "updates." You can ensure the authenticity of an update by going to the app's website.

SMARTPHONE AV

Add Extra Protection with a Third-Party Security App

Currently, smartphone malware infections are rare—nothing like what you see with PCs. But as proliferation of the devices grow, expect viruses, worms, and trojans to become more of an issue. To combat these threats, you need third-party software, and if you're like the majority of smartphone users, you don't have it. But even if malware isn't a pressing problem at the moment, a security app can offer other useful benefits, such as browsing protection, telephone

and text-message spam blocking, and theft-protection features like locking down, wiping, or even locating a stolen phone.

You can find mobile security apps by many of the big names in PC protection. Independent security testing lab AV Comparatives (www.av-comparatives.org) recently evaluated mobile apps from ESET, F-Secure, Kaspersky, and Trend Micro and gave them all "Approved" designations.



Protect Your Network



Keep your digital bits out of the hands of baddies

Use Google Public DNS

If the crooks can't convince you to visit their phony-baloney banking webpage, the next step is to get you there against your will. One way to do that is to poison the DNS cache you're using. The DNS server translates URLs into IP addresses. By exploiting flaws in the DNS software, crooks are able to redirect you to any sight of their choice—even if you typed in the correct URL of your bank.

To avoid this, we recommend switching from your ISP's DNS to Google's public DNS (<http://bit.ly/7Ti5tM>). It's free and the company has implemented many of the recommended safeguards against cache poisoning. To change the DNS on your client PC, go to Network Connections, right-click on your connection, and double-click Internet Protocol. Then simply enter the preferred DNS of 8.8.8.8 and alternate of 8.8.4.4 and click OK.

Conduct Personal Business at Home

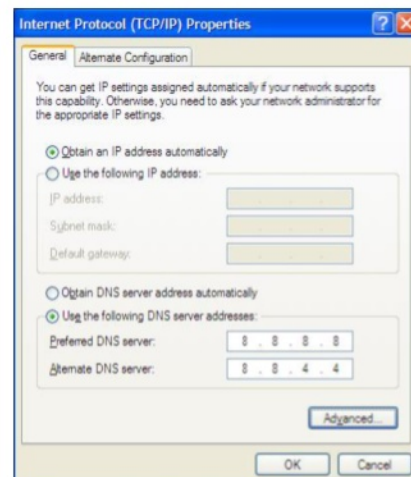
You want a simple reason not to check your personal email at work? Someone in your network could be using a so-called "man in the middle" attack to spy on you. Whether

by exploiting ARP cache poisoning, session hijacking, or some other technique, MITM attacks let a crook steal the credentials issued to your machine and then fool, say, Yahoo or Gmail into thinking he's you.

At work, with hundreds of computers and a network that stretches the coasts, you really wouldn't know where the MITM attack is coming from. This risk negates the possibility that your corporate network is more secure than your home network. So, assuming you have secured your home Wi-Fi (or don't use wireless) and that the other machines on your home LAN are secure, save your personal email and banking for home.

Secure Your Wireless

Quick, what's the most secure wireless available today? None. OK, we jest, but probably no wireless protocol is 100 percent secure. But just because there's a theoretical way to break the latest wireless encryptions doesn't mean you should be using the weakest form. The weakest, of course, is WEP. Easily broken in under a minute by anyone capable of reading an Internet how-to, WEP is far less secure than WPA or WPA2. If you're running WEP because some old hardware doesn't support WPA2, consider junking the old equipment or upgrading your router to



Bypass your ISP's DNS for one that's likely faster and more secure, Google DNS.

one that supports guest networks. This lets you keep your internal network behind WPA2, while keeping guests roped off with the weaker WEP protocol to access the Internet. If you're running WPA2, the adage in security circles is that the longer and more randomized the key, the better.

Although not a guarantee, you can also set up your router's wireless to only accept connections from known MAC addresses. These are the unique IDs assigned to each computer's network card. The hole there is that an intruder could easily spoof a MAC address from a trusted client to still access your wireless network.

Check Each Machine's Shares and Services

You can check what files are shared on a machine by right-clicking My Computer, selecting Manage, and clicking Shared Folders. Great, now how do you do it for all of the machines on your network? One way is to use NetBrute Scanner (www.rawlogic.com). This free utility will scan your internal network and report on shared resources that are available.

Paglo RogueScanner			
File Help		Statistics	
		254 Addresses Scanned	
		6 Devices Found	
		Scanning Status	
		0 Threads Active	
		0 Pending Probes	
		Need Inventory Manager	
		Use Paglo to discover all of and users.	
IP Address	MAC Address	Vendor	Model
192.168.10.1	00:14:D1:C5:22:40		Not classified yet
192.168.10.112	00:26:2D:00:7D:A8		Not classified yet
192.168.10.101	00:80:77:00:73:FF		Not classified yet
192.168.10.102	00:01:36:16:95:43		Not classified yet
192.168.10.103	00:13:02:20:34:77		Not classified yet
192.168.10.105	00:23:54:55:01:5E		Not classified yet

Running an internal port scan may help reveal intruders freeloading on your network's bandwidth.

Scan Your Network for Intruders and Piggybackers

If a neighbor has broken into your network so he or she could download movie torrents, how would you know? Since most home networks use DHCP, go into your browser's setup screen and

check the DHCP screen to see how many IP addresses are assigned. Then, try to match those up with the systems on your network. If you have more IP addresses assigned than devices (remember that your smartphone will eat an IP address if it's using Wi-Fi), you may have an intruder. Another option is to use RogueScanner, a free tool that will query devices on your

network and compare them to an online database of devices to help you identify the machines.

So what do you do if you have an intruder or suspect one? Since the person has likely infiltrated your network via wireless, you'll want to lock down your wireless by switching to WPA2 and using a very long and very random key.

PRESENT OFFENDERS

BY DEREK MANKY
FORTIGUARD LABS



Today's Top 5 Threat Vectors

JAVASCRIPT JavaScript is the root of many threats, since it is universally used by many applications such as web browsers and document readers. The Gumblar botnet is an active botnet that uses server-side polymorphic JavaScript code to infect machines, thus leveraging the language to start its dirty work. This means that each time you visit an infected Gumblar site, a new (previously unseen) script is sent to your browser that will begin fingerprinting—looking for software vulnerabilities. Once fingerprinted, the JavaScript will then attempt to serve up malicious exploits through other vectors such as PDF/Flash.

PDF/FLASH VULNERABILITIES There have been many zero-day vulnerabilities disclosed (and exploited) in 2010 based on PDF/Flash. These exploits have pioneered new attacks that bypass enhanced security measures such as address space layout randomization (ASLR) and data execution prevention (DEP). Due to the ubiquity of PDF/Flash technology, attackers use these vulnerabilities as a favorite way to infect machines. Oftentimes, end users think they cannot become infected through document/media files (only executables); this mentality needs to change quickly, because these vulnerabilities now present a very real and serious threat.

BOTNETS Once a machine is infected, there is another threat vector that exists—a botnet's command and control (C&C) channel. Every botnet needs to phone home in order to receive commands and send stolen data. We see this as a potent threat vector, since if this channel is blocked, no instructions can be carried out, and no stolen information can be sent. There are lots of innovative ways that botnets try to discretely access C&C channels, but the most prevalent way remains HTTP, and, as a result, we deem the HTTP protocol itself a nasty threat vector. Most botnets will simply use

RFC-compliant HTTP POST/GET commands; however, some will encrypt the payload to avoid detection.

XSS HOLES Cross-site scripting (XSS) holes have always been on the radar as one of the most dangerous web-based threats and continue to enjoy success because plenty of holes still exist on the web. A great example is a worm that hit Twitter in September 2010, where malicious tweets were sent out utilizing a freshly discovered XSS hole. While Twitter took quick action to shut this down, the worm was highly effective since it only required a user to roll their mouse over a link without having to click (it used the JavaScript onmouseover technique). By doing so, the worm would then send further malicious tweets on that user's behalf.

Persistent and nonpersistent XSS holes exist because of development oversights when implementing websites. Because they have existed for a while, and continue to be a problem, it is important to underscore the necessity of safe development practices to mitigate these threats.

THUMB DRIVES USB drives are actually one of, if not the most, common ways you can infect a network from inside a firewall. There are several reasons for this: They're cheap, small, hold a lot of data, and can be used among multiple computer types. The ubiquity of thumb drives has driven hackers to develop targeted malware, such as the notorious Conficker worm, that can automatically execute upon connecting with a live USB port. What's worse is that default operating system configurations typically allow most programs (including malicious ones) to run automatically.

Derek Manky is project manager and cyber security and threat researcher at Fortinet's Fortiguard Labs, and author of Fortinet's monthly *Threat Landscape Report*.



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The Ultimate Thumb Drive Toolkit

Five ways to put your collection of neglected thumb drives to good use **BY MARCO CHIAPPETTA**

ALTHOUGH THEY WERE once considered expensive luxuries to most users, USB thumb drives have become nearly as ubiquitous as the now defunct floppy disk. Thumb drives of all shapes and sizes are currently sold at corner drug stores, freely disseminated at trade shows, and even given out as digital business cards. Thumb drives are so commonplace now that it's not unusual for PC users to have amassed huge collections of drives that, for the most part, do little else but sit around collecting dust. We speak from experience.

Though some of the drives you'll have lying around are likely to be small in terms of their usable capacity, that doesn't mean they're useless. Even thumb drives with capacities of only a few megabytes can still come in handy for creating things like bootable DOS disks, which can be used to flash the BIOS on an older motherboard or graphics card, or even bootable disks with a full-blown HTPC operating system.

We're going to cover a number of handy projects in this article that'll help put those neglected thumb drives to good use. Before we continue, though, a word of caution: All of these projects will destroy the data stored on the drives. If there's anything important on them, back it up before attempting any of the projects listed here. You'll be happy you did—trust us on this one.



Create a Custom Windows Install Disk

Speed up and minimize the hassle of installing Windows

Many of us have installed Windows more times than we can count. Whether it's for building or testing a new system or repairing an older rig, installing Windows can be a regular occurrence. With more recent versions of Windows, the installation process has become more streamlined, but it can still be a chore, especially if you're using optical media and have to manage multiple discs and product keys for all of the different versions that are available. Thankfully, there's a faster and easier way to do it using a USB thumb drive.

There are a number of ways to create and customize a Windows installation disk. We're going to outline one of the easiest methods here using Microsoft's own Windows 7 USB/DVD download tool (the same process works with Windows 8, too) and a bit of simple file editing. When done, you'll have yourself a customized Windows installation disk that can install any edition of Windows—like Home Premium and Ultimate or Windows 8 and Windows 8 Pro—and it won't require a product key during the installation process. There are much more involved methods for customizing a Windows installation disk, which can also give users the ability to incorporate applications and drivers and even pre-configure many settings, but for most enthusiasts, the method we'll outline here should still come in quite handy.

GATHER YOUR MATERIALS

Before you begin, you'll need to have a USB thumb drive with a capacity of at least 4GB (larger is better if you want to store other files on the drive), ISO files for Windows 7 or 8 (a Google search will lead you to a legitimate source for the ISO you need, such as Digital River), a copy of Microsoft's Windows 7 USB/DVD tool (download here: <http://bit.ly/162L74X>), and, of course, a PC running Windows to complete the process. Note that the Windows 7 USB/DVD tool requires the .NET Framework to be installed on your machine, so you may need to install that, as well.

INSTALL FILES TO DRIVE

Once you've got your ISO file(s) handy, connect the thumb drive to your system, note its drive letter, and then install and run the Windows 7 USB/DVD tool. On the initial screen, you'll be prompted to browse for your Windows ISO file. Click the Browse button, navigate to wherever you saved the ISO, click the Open button, and then click Next. On the subsequent screen, you'll be asked to

choose your media type. The Windows 7 USB/DVD tool can create a bootable DVD or USB device. Since we're focused on thumb drives here, click the USB Device button. On the next screen, choose your thumb drive from the drop-down menu and then click the Begin Copying button. The Windows 7 USB/DVD tool will format and prep the thumb drive and then copy over all the necessary installation files automatically.

When the Windows 7 USB/DVD tool is done doing its thing, close it, and you're technically finished and ready to go. However, by default, the installer will only offer the option to install whichever version of Windows was designated by the ISO used to create the drive (Home Premium, Ultimate, etc.). Windows 7 and 8's image-based installation method is capable of installing any edition of Windows (within the same family) with a bit of tweaking, though.

EDIT YOUR ISO FILE

If you created a Windows 7 install drive, insert it into your PC and browse to the \sources\ directory. In that directory, delete the file named ei.cfg. With Windows 8 the process is a bit different. Create a simple text file named ei.cfg (or edit the one you have if it is already present) with the following contents:

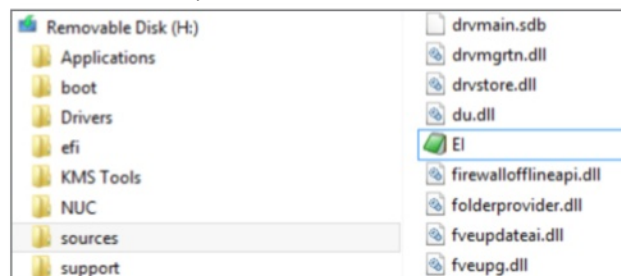
[Channel]

Volume

[VL]

1

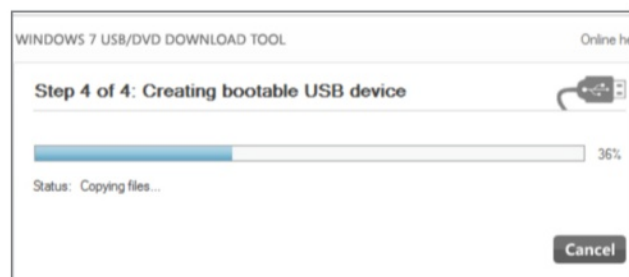
Save the file and you're done.



Deleting or editing the ei.cfg file in the \sources directory on a Windows installation disk will allow different versions of Windows to be installed using the same media.

THE RESULTS

So, how much time can you save installing Windows from a USB thumb drive? When using a USB 2.0 flash drive, it took Windows 7 Ultimate x64 six minutes, 14 seconds to go from the "Windows is loading files" prompt to the "Completing installation" prompt on a Core i5 Dell laptop equipped with a 128GB SSD. Performing the same test with a USB 3.0 drive resulted in a time of only five minutes, 49 seconds. When timed using the Windows 7 installation DVD, however, the same process took 13 minutes, 51 seconds. That's a big time savings, especially if you find yourself installing Windows often. Store all of your favorite applications and most commonly used drivers on the thumb drive as well, and you can have them all installed right away, too, without having to swap a single disc.



Microsoft's Windows 7 USB/DVD tool can prep a thumb drive and copy the installation files over in just a few simple steps.

Take Your Apps on the Go

Portable apps let you use any PC without leaving a trace

By far, one of the handiest things to do with a USB thumb drive is to create a mobile workspace, loaded up with portable apps. If you're unfamiliar with portable apps, they're essentially self-contained versions of programs that work entirely from their installation directory and don't leave any trace on the host PC. Once configured, you can take your thumb drive loaded up with portable apps anywhere, plug it in, and all of your favorite applications and data will be right there waiting for you.

Portable versions of popular applications are freely available from many developers' websites. Technically, all that's required to use a portable app is to download and install/run it right from a thumb drive. If you'd like to have a wide assortment of portable apps available, however, managing them all can get a bit unruly, since you can't simply create a directory of shortcuts—the shortcuts break if the thumb drive's drive letter changes. But that's where the PortableApps Platform comes in.

ENTER PORTABLEAPPS

The PortableApps Platform is an easy-to-use launcher for managing and running portable apps. To use it, download the tool from www.portableapps.com and install it to your thumb drive. While on the site, you can download a wide array of portable apps too. Install

the portable apps to the thumb drive as well, and when you run the PortableApps Platform (by double-clicking the Start application on the root of the drive), all of your apps will be listed in a Start-Menu-like launcher.

Some of our favorite portable apps are Firefox, FileZilla, 7-Zip, OpenOffice, and GIMP. For the most part, if there's a popular open-source desktop application available, there's a portable version of it out there, too.



The PortableApps launcher gives you easy access to all of your portable apps from a single interface.

Install a Dedicated HTPC OS

Use OpenELEC on a thumb drive for media duties

There's a lot of debate among home theater PC enthusiasts. Some prefer their HTPCs to be Jacks-of-all-trades that run Windows and are as adept at playing movies as they are at running desktop applications. Others prefer their HTPCs to be simple boxes that are strictly for multimedia playback.

Well, why not have both?

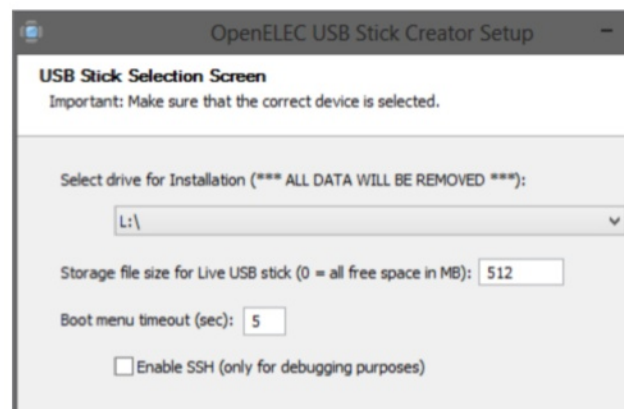
The Open Embedded Linux Entertainment Center, or OpenELEC, is a tiny Linux distro that leverages XBMC (formerly known as the Xbox Media Center) and can be run right from a bootable thumb drive (or any external drive, for that matter). With OpenELEC, your HTPC's internal drive can boot whatever OS you like, but should you choose to go the streamlined route, you can boot from the OpenELEC-equipped thumb drive and quickly access your media.

GET OPENELEC

If you'd like to give OpenELEC a try, point your browser to www.openelec.tv and download the distribution that best matches your hardware. There are versions for AMD APUs, Intel processors, and Nvidia Ion-based platforms—among many others—with file sizes of only 80–125MB. Once you've got the distro downloaded, decompress it into a folder, and connect the thumb drive you'd like to use to your PC—it can be as small as a few hundred megabytes.

In the folder where you've decompressed OpenELEC, you'll find a file named `create_livestick`. Double-click it, and follow the on-screen prompts to prep the thumb drive and install OpenELEC. The process requires only four clicks: two to start the installation and accept the license agreement, a third to select the thumb drive (which should be automatically identified), and a fourth to finalize the installation.

When the OpenELEC installation is done, connect the thumb drive to your HTPC and boot from it. On the initial splash screen you'll be asked to either install it to the PC or run the live edition right from the flash drive. Run the live edition and configure XBMC to your liking and you're good to go.



OpenELEC includes a utility to prepare a bootable thumb drive containing the OS.

Create the Ultimate USB Boot Drive

Arm yourself with the tools to meet any PC emergency

Every PC tech, amateur, or pro needs a boot disk in their arsenal jam-packed with various apps and utilities for recovering files and passwords, scanning for malware or disk defects, taking disk images, and myriad other essential tasks. There are a handful of excellent options to choose from, but few offer as extensive a line-up of applications as Hiren's Boot CD.

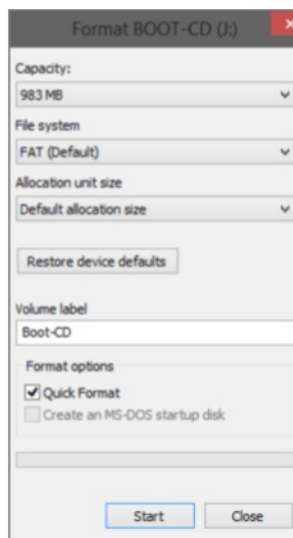
Hiren's Boot CD, available at www.hirensbootcd.org, started its life as a less-than-savory tool rife with pirated software. But the developers have since gone legit and replaced all of the pirated apps with excellent freeware alternatives. The Hiren's Boot CD ISO is meant to be burned to a disc so it's write protected and insulated from malware, but it can also be written to a thumb drive using a couple of freely available utilities.

PREPARE YOUR DRIVE

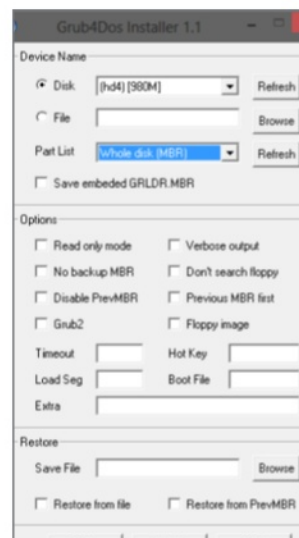
To create a bootable thumb drive with Hiren's Boot CD files, you'll need a drive with a capacity of at least 1GB, a copy of the Grub4DOS Installer (also available at HirensBootCD.org), the Hiren's Boot CD ISO, and if you're on Windows 7, a utility like WinRAR or 7-Zip to extract the necessary files from the ISO (Windows 8 can mount ISO files natively, so you won't need a separate utility). Once you've got everything gathered up, connect your thumb drive and format it using the FAT file system (right-click the drive in File Explorer and choose Format from the menu), to ensure the drive is free of any data. Then run the Grub4DOS Installer utility as an administrator. In the program window that opens, click the Disk radio button and then select your thumb drive from the adjacent drop-down menu. Then, hit the Refresh button next to the Part list drop-down menu and select Whole disk (MBR) from the associated drop-down. Hit the Install button at the bottom of the interface to install the Grub4DOS universal bootloader to your thumb drive—it'll only take a couple of seconds.

POPULATE YOUR DRIVE

Once you've got the Grub4DOS bootloader installed, the next step is to copy all of the Hiren's Boot CD files over to the thumb drive. Extract the files from the ISO (or mount it if you're on Windows 8) and copy all of the files and folders to the thumb drive. When all of the files have been copied over, navigate to the HBCD folder on the drive and copy the grldr and menu.lst files within the HBCD folder to the root of the drive. Once the grldr and menu.lst files have been placed on the root of the drive, it's ready to use.



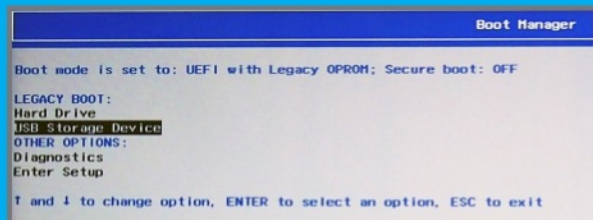
To prep your drive, format it first to ensure it is clean and free of data.



You'll need to install the Grub4DOS bootloader to your thumb drive before it'll run Hiren's Boot CD.

Troubleshooting: Booting from USB

All modern systems should offer the ability to boot from a USB drive, barring some corporate PCs that may have security measures in place to prevent it. Should you have problems booting from a USB drive on your personal system though, there are a few things that could be at play. First, check that your system is configured to boot from the USB drive. Connect the drive,



Your system won't boot to the USB drive unless it's selected in the BIOS or boot menu.

restart the system, enter the BIOS (usually by hitting Del or F2 during the POST), and under the Boot menu make sure the USB drive is being recognized and that it is first in the boot order. On many systems, you can usually hit F11 or F12 during the POST to load a one-time boot menu as well, and select the USB drive there. You may also have to enable the option to boot from USB, depending on your motherboard manufacturer.

If none of that works, there's also a chance there's an incompatibility between your drive and a third-party USB controller. Plug your drive into a USB port that's native to your motherboard's chipset and then try booting again. Another possibility is some sort of corruption on the USB drive itself. As a last resort, copy all of the data from the drive to your PC and use Windows' Diskpart utility to clean the USB drive of any partitions, then create a new primary partition, set it to active, and reformat/reconfigure the drive. We've got a more detailed step-by-step on using Diskpart in the "Windows to Go" section on page 49.

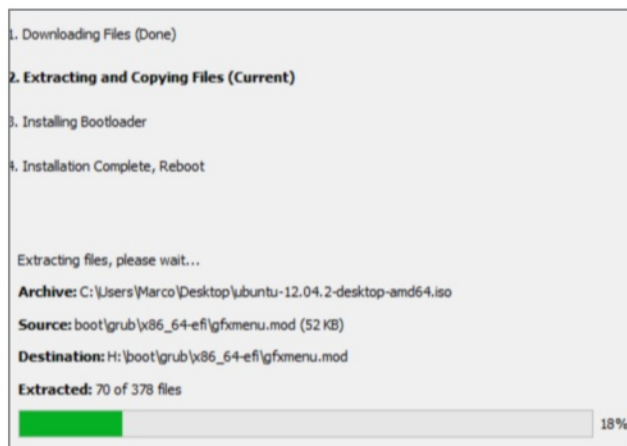
Create a Linux Live Bootable Key

Try any version of Linux, without altering your current system

Experimenting with different versions of Linux is a great way to utilize those thumb drives cluttering up your junk drawer. There are a ton of utilities out there that can help ease the setup process, but one in particular, the Universal Netboot Installer, or UNetbootin for short, makes the entire process, from selecting and downloading a distro to prepping a thumb drive, about as easy as could be.

GET UNETBOOTIN

UNetbootin can be downloaded at <http://unetbootin.sourceforge.net>. It is a stand-alone utility that doesn't need to be installed. Once downloaded, simply double-click the file to run UNetbootin and on the initial screen you'll have two options: to either select a distribution to download and install (there are hundreds to choose from) or to create a bootable thumb drive using a pre-downloaded ISO. If you'd like to experiment with different Linux distros, UNetbootin will download and install them to your flash drive right from its main interface—there's no need to scour the web on your own. If you've already got some ISOs downloaded and just haven't gotten around to burning them, UNetbootin can use those, too. For the purposes of this project, we downloaded the popular Ubuntu Linux ISO, but just about any distro should work.



UNetbootin is a one-stop shop for downloading and creating Linux Live bootable thumb drives.



The UNetbootin boot menu gives you the ability to run Linux right from the thumb drive or to install it to the host PC.

CREATE LINUX LIVE DRIVE

To create a Linux Live USB drive, UNetbootin extracts the necessary files from an ISO, copies them to the thumb drive, generates an appropriate config file, and then makes the drive bootable. To use UNetbootin, connect your thumb drive to your PC, run the utility, and download a distro (or choose your pre-downloaded ISO) right on the initial screen. The thumb drive should be a few hundred megabytes at minimum, but larger (think 2GB-plus), faster drives are preferable. Once you've chosen the distro and selected the thumb drive from the menu, click the OK button and UNetbootin will download and/or extract the necessary files and automatically copy them to the thumb drive. The utility will then make the drive bootable, and when complete, UNetbootin will prompt you to exit or to restart the system, should you want to give the thumb drive a try right away.



Most Linux distributions, like Ubuntu, which we used for this project, run very well from a USB thumb drive.

PUT IT TO USE

To use your Linux Live bootable thumb drive, simply boot to it, and at the UNetbootin menu select "Try Ubuntu without installing" (or whichever distro you chose). The OS will run right from the thumb drive as if it were installed locally on the host PC.

Linux Live bootable drives are particularly useful for not only learning your way around Linux, but also as pseudo-recovery discs, as well. If you've got a Windows PC that won't boot and you need to recover files, booting to a Linux Live drive may allow you to access the system's hard drive and copy whatever files you may need.

Set Up a Windows to Go Environment

The perfect excuse for buying a new USB 3.0 thumb drive

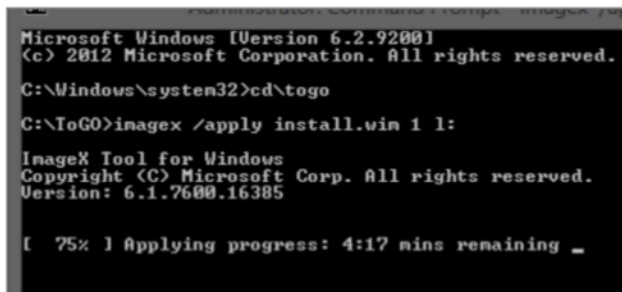
One of the coolest new features of Windows 8 is its ability to run from a USB thumb drive. Microsoft calls the feature "Windows to Go." With Windows to Go, you can install Windows 8 and all of your favorite applications and tools to a thumb drive, plug it into a PC, boot to the drive and your entire workspace will be available.

To create a Windows to Go portable environment, you need a USB 3.0 thumb drive with a capacity of at least 32GB, a Windows 7 or 8 PC to actually configure the thumb drive (Windows 8 is preferable because of its native ability to mount ISO files), Microsoft's Automated Installation Kit, or AIK (available here: <http://bit.ly/relfql>), and a Windows 8 installation disc or ISO.

FIRST THINGS FIRST

If you've got everything available and downloaded, install the Windows AIK first. It'll create a \Program Files\Windows AIK directory with a number of other directories within. In the \Tools subdirectory, you'll see a number of other subdirectories labeled with specific system architectures. If you're creating the Windows to Go drive on a system running a 64-bit edition of Windows, open the \amd64 folder. If you're running a 32-bit edition of Windows, open the \x86 folder. In those folders you'll see a file named ImageX.exe. Copy ImageX.exe and place it into a new subdirectory of your choosing—we used C:\ToGo.

Once you've got the correct ImageX utility copied, you need to extract the Windows installation image from the Windows 8 ISO. Mount the ISO (or extract it to a folder) and in the \sources directory find the file labeled install.wim and copy it to the same directory in which you placed the ImageX utility.

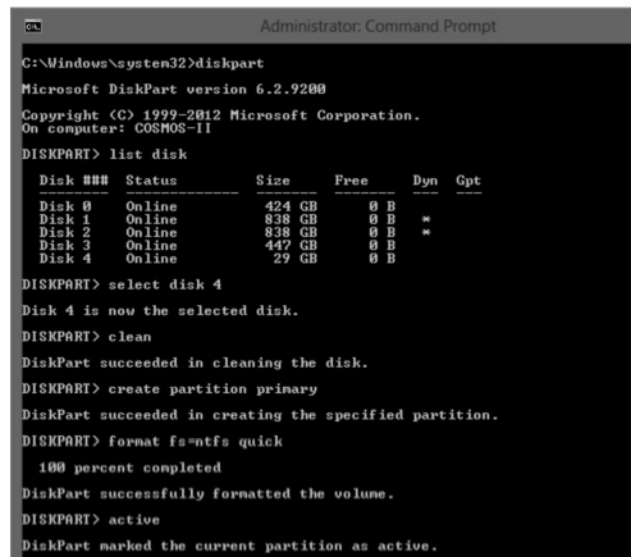


The ImageX utility included in the Windows AIK is used to install the Windows image to the USB flash drive.

PREP YOUR DRIVE

With ImageX and the Windows 8 install.wim file copied, it's time to prep the flash drive. Connect the drive to your system, then open a command prompt as an administrator and run Diskpart. At the Diskpart prompt, first type **list disk** and hit Enter to see a numerated list of drives connected to your system—on our machine, the thumb drive we wanted to use was listed as Disk 4. When you know the number of your thumb drive, type **select disk 4** (replace the 4 with the number of your drive) at the Diskpart prompt and then hit Enter again. Once the proper drive is selected, you've got to run a handful of commands to clean, re-partition, and reformat the drive in

preparation for the Windows to Go installation. Type the following commands in succession, hitting Enter after each one: **clean**, then **create partition primary**, then **format fs=ntfs quick**, then **active**, then **assign**. Then exit the Diskpart utility and navigate to the directory where you placed the ImageX and Install.wim files. Since we used C:\ToGo, at the command prompt we typed **cd\ToGo** and hit Enter.



Use Windows' built-in Diskpart utility to clean the flash drive, create an active primary partition, and format it with the NTFS file system.

INSTALL WINDOWS

The next step is to actually install Windows to the flash drive using ImageX. At the command prompt, type: **imagex /apply install.wim 1 X:** (where X is the drive letter of your flash drive). This command tells ImageX to apply the first image within the install.wim file to drive letter X. The installation process will take a good 15–20 minutes or so depending on the speed of your drive. Once the ImageX process is complete, the next step is to install the correct boot record. While still at the command prompt, type **bcdboot.exe X:\windows /s X: /f ALL** (again, replace the X with the drive letter of your thumb drive) and hit Enter. This command tells the bcdboot utility to install the boot record from X:\windows directory to the root of the drive.

Once the boot record is installed, your Windows to Go drive is ready to use. The first time you boot to it on a system, it'll detect new hardware and configure the necessary devices, but it'll eventually load the Modern UI and behave just like a local Windows installation. Activate the OS, install your applications and any necessary drivers, and you're done. ☺

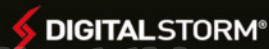
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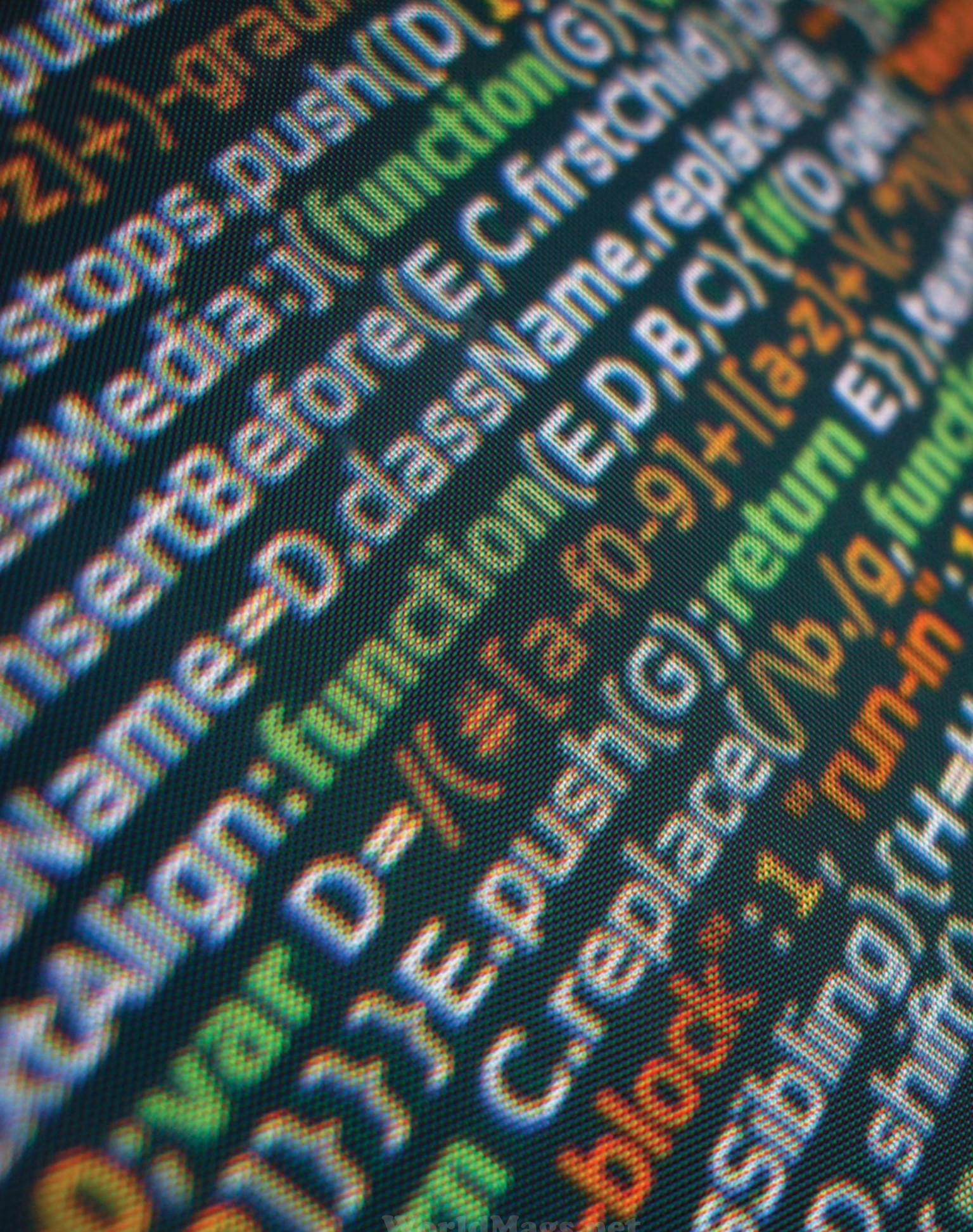
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Cracking the Code

Every PC user should know how to program, and there's never been a better time to learn

BY ALEX CASTLE

WITH THE HUGE variety of computing devices all around us, it's important to remember what it is that's special about a full-fledged personal computer. We think the main difference can be summed up in one word: mastery. No matter how much time you spend with an iPad or an Android phone or in a web browser, you can never truly master it. There's just not enough there to learn. But the PC? That's different. The PC goes *deep*.

As you develop your mastery over the PC, you move past all sorts of boundaries. First, you learn to replace the software that came on the computer. You discover the command prompt and how to tweak the OS. You learn to build your own PC, and to benchmark it. And then, at the very bottom of it all, there's one last boundary standing between you and true PC mastery. You have to learn to program.

Why is coding the ultimate test of PC mastery? Because learning how to program is the thing that breaks down the wall between you and your computer—it makes it possible for you to truly understand what's going on underneath your desktop.

And, all philosophical ramblings aside, it's a pretty great skill to have. Whether you need to automate a process on your computer or whip up a quick web app for a family member's website, knowing how to code is a big boon. Who knows, you might even be able to earn some money.

Learning to program isn't something you can do in an hour, or even in an afternoon. You have to learn to think in a whole new way, which takes dedication and patience. Fortunately, it can also be a lot of fun. In this article, we're going to take a whirlwind tour through some of the most important concepts in programming, and we'll direct you to resources that'll help you start your adventures in coding.

BASIC INFORMATION

A Q&A ON THE ABCs OF PROGRAMMING

Before we can do anything, we've got to cover the basics. Here's what you have to know before you can get started.

WHEN WE SAY "PROGRAMMING," WHAT DOES THAT REALLY MEAN?

For this article, we're going to use a fairly narrow definition of programming, and say that what we're talking about is the process of creating software on a computer. That process involves writing out a series of commands for the computer to execute, which will create our desired behavior. We write those commands using a programming language.

WHAT'S A PROGRAMMING LANGUAGE?

A programming language is the set of rules that define how we express what the computer should do when it executes the program. There's an incredible variety of programming languages available for use, but the vast majority of commercial and personal software is written in one of a core group of languages including C/C++, Java, C#, Python, and a few others. Modern programming languages share a lot of the same basic concepts and some syntax, so learning your second, third, or fourth programming language is much easier than learning your first.

WHAT MAKES ONE PROGRAMMING LANGUAGE DIFFERENT FROM ANOTHER?

Each programming language has its own strengths and weaknesses. C and C++ are *low-level* languages, meaning that code written in C is closer to the *machine code* that your CPU understands (see sidebar below). Low-level languages can produce faster, more efficient software, so they're used where performance is at a premium—for programming an operating system or a 3D gaming engine, for instance. *High-level* languages, like Java and Python, have the advantage of being much easier to program in, and the same program can generally be written with fewer lines of code in a high-level language.

BUT WHICH ONE'S THE BEST?

There's no one best language—it really depends on what kind of programming you want to do. If you want to program native Windows applications, you'll use C#; if you want to program sophisticated web applications, Ruby would be a good choice; if you want to be the next John Carmack, you should probably start with C.

NO, FOR REAL, WHICH LANGUAGE SHOULD I START WITH?

The secret is to not stress too much about whichever particular language you start with. The important things you will be learning are all basic concepts that work pretty much the same in every programming language. You'll learn how to use data structures and conditionals and loops to manage how your code flows. You'll learn to structure your program in a way that's readable and organized. Once you've done all that, learning a bit of syntax to pick up a new language won't seem like much work at all.

But, if you really want a suggestion, start with JavaScript. It's an easy language to learn, it's got some practical applications, and its syntax is similar enough to some more-powerful languages like C# and Java that making the transition later on won't be too hard.

IS HTML A PROGRAMMING LANGUAGE?

Not quite! HTML is a markup language, used to define the contents of a webpage. Although HTML has a specific *syntax* (a set of rules defining how you have to write things), it doesn't have *semantics*, or meaning. An HTML document is *rendered*, rather than *executed*. That said, if you have written an HTML document, you at least have experience writing a formalized computer language, which may make the jump to programming easier.

How Does It Actually Work?

When you write a program in a high-level language like JavaScript, the document you create isn't something that your computer's low-level hardware can understand. The CPU has only a limited number of instructions it can perform, such as addition, subtraction, and moving numbers into and out of memory. These instructions are actually physically implemented in the CPU using transistors organized into *logic gates*. Though modern instruction sets, such as the X86-64 set implemented in any consumer 64-bit CPU, are actually very large and sophisticated, programming for the CPU direct-

ly (using a super-low-level language called *assembly language*) is an arduous, slow process.

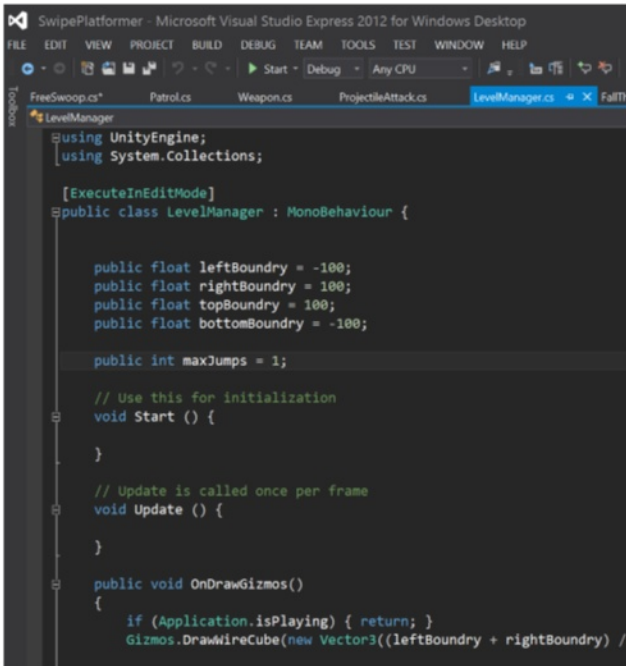
High-level languages allow you forgo a lot of the technical grunt work. For instance, in a high-level language, you can simply declare and use variables as you please, without ever worrying about what exactly is going on in your system's memory. In assembly language, you have to manually assign data to locations in memory as you use it, and clear up the memory when you're done.

In order to get your high-level program to run on the CPU, you need a *compiler*—a piece of soft-

ware that optimizes your code and converts it into a machine-readable executable file. Some languages, such as Java, are not compiled, but rather *interpreted*, which means that the source code itself is distributed, and then compiled on the end user's machine. The upside of an interpreted language is that you can distribute a single file that can be run on Windows, OSX, or Linux. The downside is that whoever runs the file has to have a copy of the interpreter on their machine—an annoyance that anyone who's tried to run a JavaScript applet on a new computer will be familiar with.

WHAT'S AN IDE?

An IDE (short for integrated development environment) is the software suite programmers use to actually write programs. They generally include a specialized text editor for writing the source code, as well as the ability to test and debug your program. Two of the most popular IDEs are Eclipse (open source, free, and available at www.eclipse.org) and Microsoft Visual Studio (proprietary and expensive, but with a free "Express" version that's limited to and excels at programming in C, C#, and BASIC).



Visual Studio is one of the most advanced IDEs around, and is used by nearly all Windows programmers.

HOW CAN I START WRITING A PROGRAM, LIKE, RIGHT NOW?

Unfortunately, it can be a bit of a hassle to get started coding in most programming languages. You generally have to install and configure an SDK (software developer kit), and sometimes an IDE as well, in order to be able to write and compile code in a new language. It's rarely super hard, but be prepared to spend 15–30 minutes Googling, reading a guide for your chosen language, and setting things up.

Fortunately, JavaScript is much easier to get started with. In fact, you can start writing code right this second, using an in-browser coding environment like JSFiddle.net. An in-browser IDE isn't a good solution for serious programming projects, but it's a great way to get started as a beginner. To start writing JavaScript in an interactive environment with structured lessons, you can visit www.codecademy.com (but more on that later).

170 Years of Programming

THE MOST IMPORTANT MILESTONES IN CODING HISTORY

1842 – THE FIRST PROGRAMMER

Ada Lovelace, daughter of the poet Lord Byron, diagrams a sequence of punch cards representing an algorithm for Charles Babbage's Analytical Engine. Though the machine was never completed and the algorithm never ran, the diagram is considered to be the first computer program in history.



1954 – THE FIRST MODERN PROGRAMMING LANGUAGE

FORTRAN, the first high-level programming language, allows programmers to describe equations with drastically shorter programs. 50 years later, FORTRAN still sees widespread usage in the fields of mathematics and science.

1978 – THE BIRTH OF C

Ken Thompson and Dennis Ritchie publish their book introducing the C programming language, which would go on to become one of the most-used languages of all time, and to have a strong influence on many of the programming languages in use today.

1995 – THE FIRST LANGUAGE OF THE WEB

Sun Microsystems releases the first version of the Java programming language. The language took off in part because of its integration with early web browsers, and remains one of the most popular programming languages in the world to this day.



CORE CONCEPTS

UNDERSTAND THESE, AND YOU'VE GOT EVERYTHING YOU NEED TO START WRITING PROGRAMS IN ANY LANGUAGE



VARIABLES

Variables in programming are a little different from the “X”s you remember from high school algebra. In programming, a variable is like an empty container—it can hold a number, a word, or any other data or data structure you want to use in your program. The program can read and change the variable’s value as it runs, letting you keep track of and manipulate data.

Variables are the basic building block of a program, and most lines of code in any program will include a variable in some form.

In some languages, such as Python, a single variable can contain one type of data (say, a number), then can be assigned to hold a different type of data (like a word). In other languages, such as C and C#, a variable is *declared*, with a particular type, and then can only hold that type of data for the rest of the program. This is the distinction between *dynamically typed* and *statically typed* programming languages.



CONDITIONALS

Most programs do not run in a vacuum—they accept some form of user input. To deal with the uncertainty that this brings, we need to be able to write code that is flexible, and to do that, we need conditionals.

Conditionals are places where the code branches. In most modern languages, they take the form of an *if statement*, which joins an expression that is either true or false (called a *Boolean expression*) and a block of code. The if statement says, in a nutshell, “If this Boolean expression is true, execute the following code. Otherwise, skip it.”

In most languages, if statements can also include an *else* clause, which allows you to specify a second block of code that will only be executed when the Boolean expression is false. For example, on the opposite page, the `99BottlesOfBeer` function includes an if statement that checks to see if the “age” variable is greater than or equal to 21, and sets a different variable called “drink” to an age-appropriate libation.



LOOPS

Another way you can control the order in which code is executed is with a *loop*. Where an if statement allows you to execute or not execute a certain block of code, a loop allows you to keep executing the same block of code multiple times.

There are several different types of loops, but the two that you’ll find in almost any programming language are the *while loop* and the *for loop*.

A while loop works a lot like an if statement. You attach a Boolean (true or false) statement to the while loop, and as long as that statement is true, the loop keeps repeating. Basically it says “as long as this statement is true, keep going.” As a consequence, something inside the looping code has to make a change that could cause the Boolean statement to become false, or else the loop will never end.

For example, the following code will print out the word “hello” 10 times, then stop:

```
while(x <= 10) {
  x = x + 1;
  print("hello");
}
```

Notice that we used the variable `x` as a loop counter, to control the number of times the loop runs. The other most common type of loop, the *for loop*, is basically just a while loop with a built-in loop counter. You tell the loop right away how many times you want it to run, like this:

```
for(int x; x <= 10; x = x + 1) {
  print("hello");
}
```

The part after “for” just defines a counter. It says “start with a number (integer) we’ll call `x`, and keep looping as long as `x` is less than 10. At the end of every loop, increment `x` by one.”



FUNCTIONS

The most powerful way to control the flow of a program is with *functions*, which allow you to reuse code. Also called a *subroutine*, a function is a block of code that you've given a name to, so you can reuse it any time you want.

For example, you could define a function called `PrintHelloThenGoodbye` by doing the following:

```
void PrintHelloThenGoodbye()
{
    print("hello");
    print("goodbye");
}
```

Then, if you called that function three times in your code, as follows:

```
PrintHelloThenGoodbye();
PrintHelloThenGoodbye();
PrintHelloThenGoodbye();
```

Your program would output "hello goodbye hello goodbye hello goodbye."

A function can also take variables as inputs, and return an output value. So, for instance, you could write a function that takes a number as an input, and returns that number squared. It would look like this:

```
int Square(int toSquare)
{
    return toSquare * toSquare;
}
```

Notice the "return" keyword. That passes the following value back to whatever part of the code called the function. So, if somewhere else in the code we called the function like this:

```
print(Square(5));
```

The program would print out the number 25.

Sample Code

This oh-so-practical program prints out an age-appropriate version of the song "99 Bottles of Beer."

```
function 99BottlesOfBeer(int age) {

    var bottlesLeft = 99;
    var drink;

    if (age >= 21) {
        drink = "beer";
    } else {
        drink = "coke";
    }

    while (bottlesLeft > 0)
    {
        print (bottlesLeft + " bottles of "
            + drink + " on the wall");
        bottlesLeft = bottlesLeft - 1;
    }
}
```



SYNTAX

Maybe the most intimidating thing about programming is the syntax—the strange punctuation marks and cryptic words that make a page of code look like a foreign language. Fortunately, in most programming

languages, syntax is really only a couple of rules that you have to remember, and a lot of syntax is shared between languages.

It's all dependent on what language you're programming in, but here are a couple of syntactical elements that are common across many popular languages:

SEMICOLON The semicolon is like the coding equivalent of a period—each line of code ends with one. It's important, because in many languages, line breaks are just for readability, and don't have any effect on the execution of the code.

PARENTHESES Parentheses are used after functions (see above) to contain that function's parameters (or inputs). You

might remember this usage from your high school math classes, when $f(x)$ was a function that operated on the variable x .

CURLY BRACES In a number of languages (particularly those derived from C), curly braces "{}" are used to enclose and group blocks of code. They're used, for instance, after the control structures described on these pages (if statements, loops, and functions), to designate the block of code that the statement refers to.

INDENTATION Because all of the control structures can be nested inside each other, code tends to take on a sort of hierarchy. A particular line of code might be inside an if statement, which is inside another if statement, which is inside a loop that's inside a function. All that can get hard to keep track of! To make it easier, code is written with variable levels of indentation. The more indented a line of code is, the more deeply nested it is. In most languages, indentation is purely for readability, but in a few (like Python), it actually controls the grouping of code, and is used instead of curly braces.

ADVANCED COURSE: OBJECT-ORIENTED PROGRAMMING

TAKING A LOOK AT THE BIGGER PICTURE

Using only the tools we've discussed so far, you can write functions that manipulate variables in all sorts of ways—the foundation of pretty much any program you want to write. Unfortunately, as the complexity of a program increases, it becomes difficult to maintain code that's organized and easy to understand using only those concepts. As an example, if you were writing code for a bank to keep track of its customers' accounts, you would quickly end up with hundreds of functions and thousands of variables. It would become very difficult to understand what was going on in the code at any particular place, and more generally how the whole thing *works*.

That's what object-oriented programming (OOP) is for. OOP is a *paradigm* that allows you to group variables and functions together into *classes*, which are (usually) meant to model things or particular concepts. For instance, in the bank example, we might start by creating a class called "Account," which simulates a user account. Classes are made up of variables and functions (called *methods* when they're part of a class), so we start by figuring out what data (variables) and capabilities (methods) an account needs to have. For variables, we might use account number, the account holder's name, and the balance. For methods, we would want the ability to deposit money, which would increase the balance variable, and withdraw money, which would decrease it.

Once you've *defined* a class, you have to *instantiate* it for every object you're modeling. So in the bank example, we would create a new instance of the account class for every customer of the bank—that way every person can have his or her own account number and balance.

It all sounds very complicated until you get to play around with it yourself, but the basic idea of OOP is that we set up a system of tens, hundreds, or thousands of objects that can co-operate with each other to produce the effect that we want.

Object-oriented programming is not the only programming paradigm in use, but it is the most common. Understanding the core concepts of classes, objects, and methods is the last hurdle to programming in languages like Java, C#, and Python.



OOP IS A PARADIGM
MEANT TO MODEL
PARTICULAR CONCEPTS

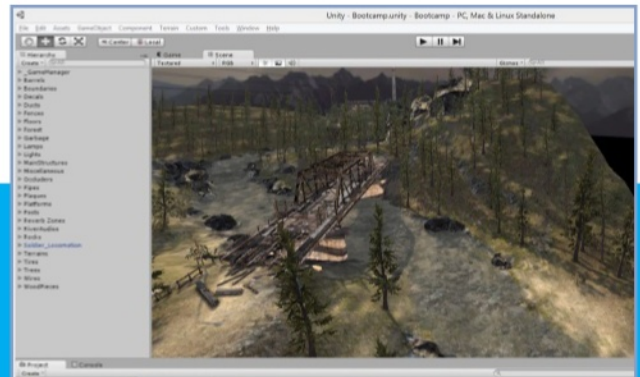
Next Steps

TWO WAYS
YOU CAN
GET STARTED
MAKING SOMETHING COOL

UNITY

If you don't pay much attention to the game-development scene, you might never have heard of Unity, the game engine that's quietly revolutionizing indie development. What's so good about it? Two things: First, Unity is a flexible and powerful engine for making 3D and 2D games. Unity takes care of all the low-end graphics and physics processing, so you can focus your coding energies on the high-end gameplay decisions. You can code in JavaScript or C# in Unity, and it can automatically build your game for you on almost any platform, from the PC to the PlayStation to the iPhone.

Second, and perhaps more amazingly, Unity is available to everyone for free. Where previously a high-quality game engine would have to



The free Unity game engine combines a drag-and-drop 3D interface with JavaScript and C# scripting.

be licensed for tens of thousands of dollars, Unity lets you code professional-quality games for free. There are a few features that you have to pay for, but the free versions should still have all the tools you need.

To get started with Unity, visit www.unity3d.com and download the free IDE. There are plenty of great resources for learning to use Unity online, and the IDE comes with an extensive sample project and tutorial.

EDUCATE YOURSELF

LEARN TO CODE AT YOUR OWN PACE WITH THESE GREAT ONLINE RESOURCES

On the previous pages, we talked a bit about semantics, syntax, and structure, the three things you need to write code. If you were able to follow along, you already know enough to start writing simple programs, and you can pick up the rest as you go. If it still seems a little murky, don't worry—programming is the kind of thing that really only clicks when you try it yourself. Here are some tips for getting your feet wet:

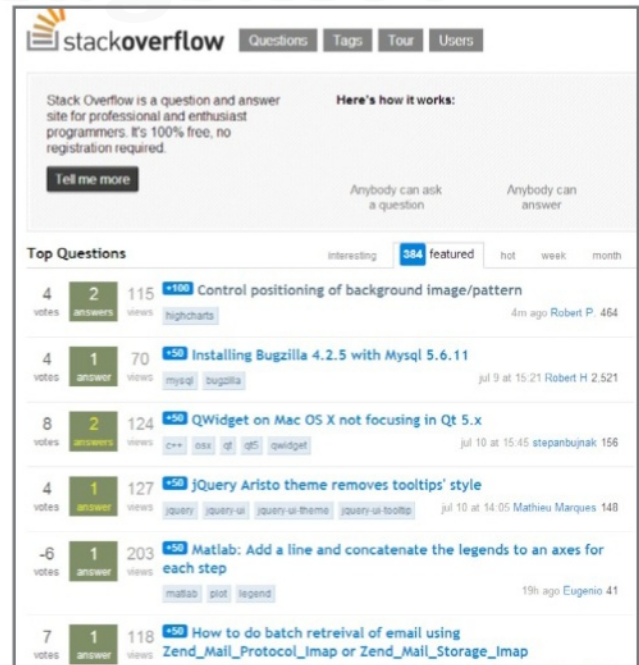
USE CODEACADEMY

CodeAcademy is the best resource there's ever been for complete beginners to learn coding. It's a series of interactive tutorials that teach you the fundamentals of programming, one bit at a time. In each lesson, you'll write actual code that compiles and runs right in your browser, and the lessons build on each other gradually enough that you'll rarely feel out of your depth.

You can learn a number of languages at CodeAcademy, including JavaScript, Python, and Ruby. It won't teach you everything you need to know to be a professional coder, but it will give you the basic familiarity with the language that you need in order to start learning more complicated concepts.

USE STACK OVERFLOW

Once you've gotten started with a language, the programmer Q&A site StackOverflow.com is the best repository for answers about more complicated topics. Don't start asking questions right away (someone has almost certainly asked about anything you're running up against), just use the search function to find answers related to any problems you have.



It's not the most newbie-friendly site on the web, but Stack Overflow is an unparalleled resource for programmers.

USE GOOGLE

Of course, Google is great for solving almost any sort of problem, but it's especially good for issues related to programming. Maybe it's because the people who tweak the Google search engine are programmers themselves, but Google is excellent at picking out relevant pages from various programming languages' documentation.

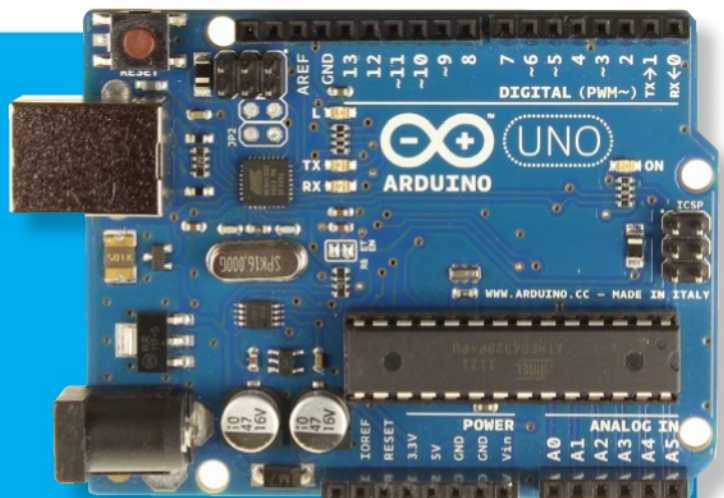
Ultimately, the key to learning to program is to not let yourself get overwhelmed. Hopefully, the concepts we've covered in this article have been enough to pique your interest, but don't worry if it's still a little confusing. Take your time, make use of the online resources available to you, and you'll have conquered the final frontier of PC power-use before you know it. ⚡

ARDUINO

If physical projects are more your thing, you can write programs that control devices in the real world, using a microcontroller like Arduino or Raspberry Pi. These microcontrollers feature small, inexpensive processors and can be programmed from your computer. By wiring the microcontroller to electronics including motors, sensors, and lights, you can build anything, from a robot to a sous vide machine.

Arduino in particular has an excellent collection of documentation and tutorials. You can find a basic Arduino UNO board at Adafruit.com, Sparkfun.com, or Makershed.com for as little as \$25-\$30, and you can download the IDE (which comes with a whole load of sample scripts) at www.arduino.cc. The IDE uses the C programming language, which is more difficult than JavaScript, but the documentation is good and the actual programming required for Arduino projects tends to be very straightforward.

So, what are you waiting for? Get out there and start making something!



An Arduino board features a microcontroller chip, along with input and output ports to hook it into any project.



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WINDOWS 8

Microsoft's latest operating system is designed to handle both your personal computing and home server needs.

THAT WINDOWS 8 is a major shift in strategy for Microsoft is pretty old news at this point. Between the Modern UI, a complete dismissal of the Start menu, focus on touchscreen devices, and myriad other changes, it's clear that this is not the Windows of the Bill Gates era. One factor that hasn't received much attention is that of Windows 8 being Microsoft's next iteration not only for Windows 7, but also for Windows Home Server.

If you haven't heard, Windows Home Server has been discontinued by Microsoft. For those not familiar with WHS, it was designed to be the central hub of your home network—providing easy access to large amounts of easily expandable storage, simple backups, media functionality, and synchronization of usernames and passwords throughout your home network. The good news is that Windows 8 provides much of the same functionality previously found only in Windows Home Server.

This guide will show you everything you need to know to build a Windows 8 home server. —TIM FERRILL

1 CONFIGURE STORAGE Windows 8 offers some new tools for configuring large amounts of redundant storage that may seem familiar if you've used Windows Home Server in the past. The Storage Spaces feature lets you group multiple physical hard drives together into a single storage pool and even provides options for redundancy. Taking advantage of Storage Spaces is probably a good idea even if you only have a single drive at the moment, given its ability to dynamically expand the size of your volume as you add more drives, much like the Drive Extender feature familiar to WHS users.

» To begin configuring Storage Spaces, you need to access the Control Panel, which can be a little tricky in Windows 8. The two easiest ways we've found to get there are:

» 1. Go to the Start Screen, type Control Panel, then click on the Control Panel shortcut (**image A**).

» 2. Move your mouse cursor to the bottom-left of the screen to bring up the Start Screen shortcut, right-click the shortcut, and choose the Control Panel option (**image B**).

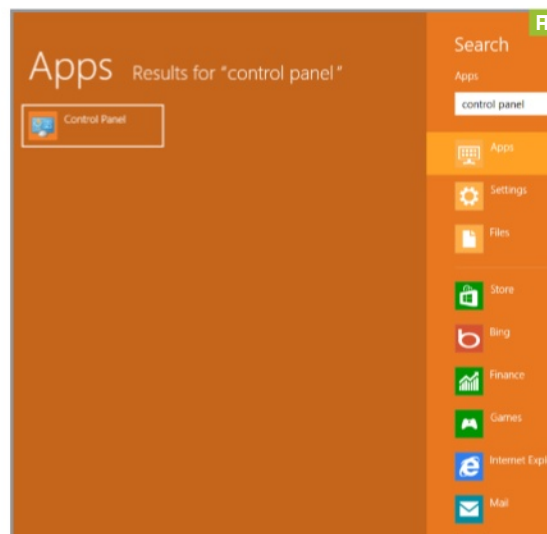
» Once you've navigated to the Control Panel, you can find Storage Spaces under the System and Security category. The first step in getting Storage Spaces up and running is to create a storage pool and add physical drives to the pool. One thing to know is that storage pools use the full capacity of your hard drive, so if you have existing data it needs to be copied off before you add the drive into a storage pool.

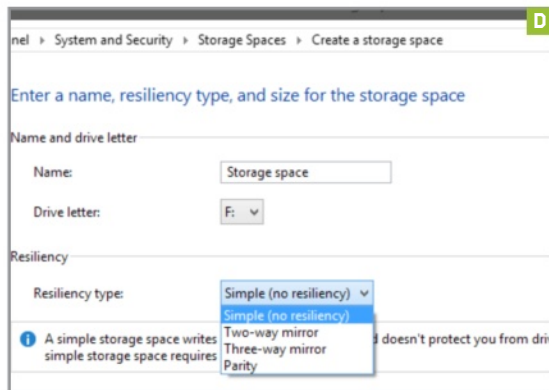
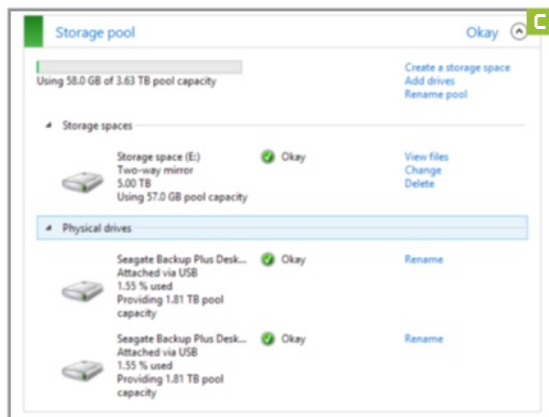
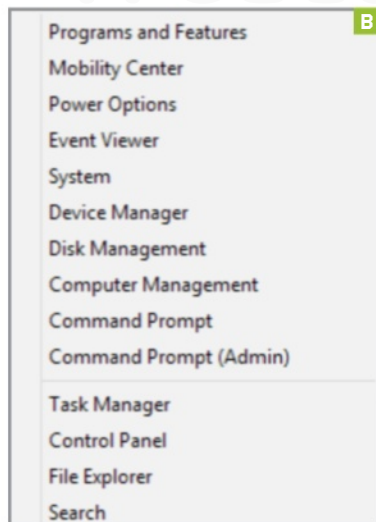
» Within the Storage Spaces applet in the Control Panel you should see a link that says, "Create a new pool and storage space." Click this link and confirm the User Account Control pop-up to begin adding drives to your storage pool. The next screen will ask you to choose the drives to use in your storage pool (**image C**). Select the drive or drives you want to use and click the "Create pool" button at the bottom of the window. Notice you can use any combination of internal and external drives to create your storage pool (we're using two 2TB Backup Plus Desk drives from Seagate connected over USB 3.0).

» Once the storage pool is created, we move on to creating a storage space. There are several options when creating a storage space, some of which require some additional explanation. The name and drive letter are probably obvious to *Maximum PC* readers; these dictate how the storage space is displayed in File Explorer. You would think the pool size would be another obvious option, but storage spaces can be configured to be larger than the amount of physical storage you have available. To be clear: This is not usable space, but it does allow you to create a large storage

space and expand through new physical drives as needed.

» Resiliency is probably the most confusing of the storage space options (**image D**). A storage space can be built to protect against drive failure by storing a duplicate copy of your data on more than one drive in a mirroring configuration. The caveats to using resiliency are that you must have multiple drives in your storage pool and the maximum storage capacity is reduced because some of the drive space is being used for resiliency. A storage space can even be configured to store an additional copy of your data in a three-way mirror. Sadly, you cannot add or change the resiliency configuration of a storage space simply by adding another drive at a later date. What you can do later is add additional drives, configure a new storage space with resiliency, and then move your files to the new storage space. Also keep in mind that you can have multiple storage spaces in a single storage pool. This means you could have a resilient storage space mirroring your important documents, and a second storage pool with no resiliency used for music or videos that you could recover through another method.





2 SHARE FILES Microsoft introduced the HomeGroup feature in Windows 7, and it's returned in Windows 8. The feature allows you to set up a relationship between the Windows PCs on your network, and eases the process of sharing files and devices between computers. There are two parts to sharing files using HomeGroups on your network.

» First, we need to create the HomeGroup and add

computers. HomeGroup settings can be found in the Control Panel under the Network and Internet category. If there is already a HomeGroup on your network, you will be invited to join the existing HomeGroup, otherwise you will be prompted to create a new HomeGroup. There's really not much to creating the HomeGroup. The system will generate a password that you must use to join other computers to the group (image E). This password can be changed later to something you can remember.

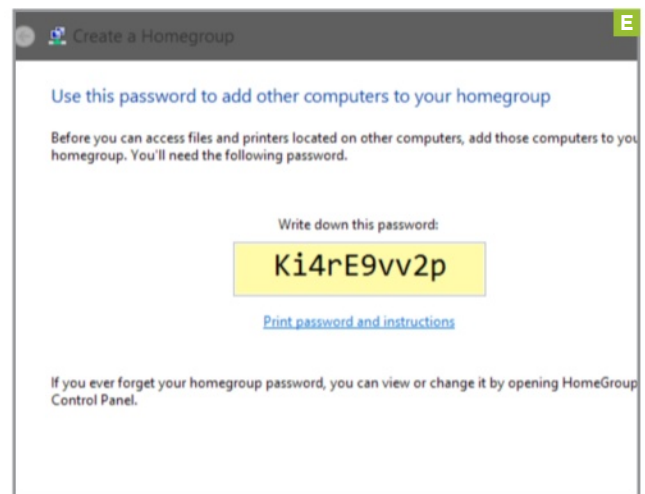
» Sharing files using a HomeGroup is most easily done by using Libraries. The HomeGroup Control Panel allows you to choose which libraries get shared with other users in the HomeGroup. If you want to simply share a single file it can be done by adding it to a shared library.

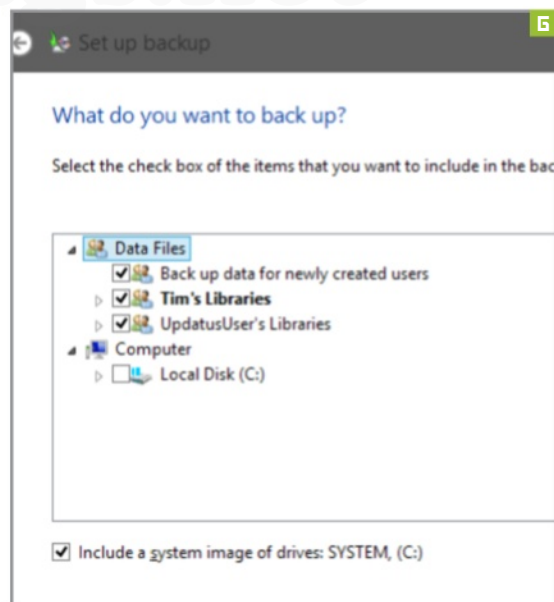
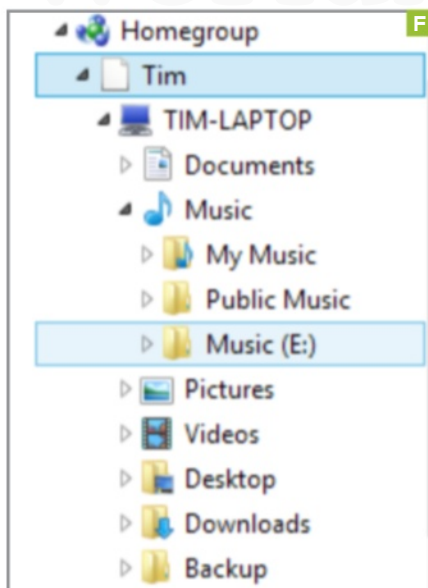
» For our scenario, we're looking to share entire folders within our new storage space. By creating Music, Video, and Pictures folders we can easily organize our media files. Additionally, we can add these folders to the existing libraries by simply right-clicking and choosing "Include in library" to start sharing them to the HomeGroup.

» Sometimes we don't want to do things exactly the way Microsoft designed, so using the existing libraries isn't always going to be a workable solution. Fortunately, you can add libraries and then share them with the HomeGroup or simply share an individual folder without using the libraries. To test this, let's create a Backup folder in our storage space. Once the folder is created, right-click the folder, choose Share With, and choose HomeGroup (image F).

» Now that we've created our HomeGroup and shared all of our files, open up File Explorer (this is another option in that power user menu we showed you earlier). In the left panel of File Explorer you should now see a HomeGroup section with your username underneath. Expanding your username should show the computers you have access to, and should provide a list of shared folders on that computer.

» Another feature of a HomeGroup is the ability to stream media over the network using DLNA. This can be configured using the Media Streaming options in the Network and Sharing Center Control Panel. The media streaming options will let you allow or disallow individual media devices on your network from accessing certain types of files.





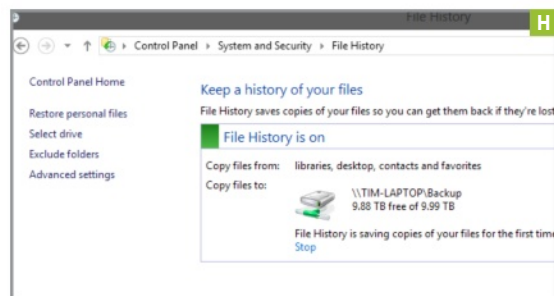
3 PROTECT YOUR DATA One thing we can't recommend highly enough is backing up your data. Few things are worse than losing years of pictures or documents because of a failed hard drive or accidental deletion. There are two aspects of data protection we want to take a look at: using your Windows 8 server as backup storage, and backing up the storage volume itself.

» Using your Windows 8 server as backup storage is as simple as using the Backup folder we created earlier as your storage volume. This can be done with most backup tools, including Windows Backup and File History (which we'll talk about in a minute). Interestingly, Windows Backup is a deprecated feature in Windows 8, which means two things. First, it's hard to find. Second, it's a feature that may disappear completely in future versions of Windows.

» To use the traditional Windows Backup features in Windows 8, go to File History in the System and Security category. Once there, you will see an option for Windows 7 File Recovery in the bottom-left corner of the window. Another option is to switch to the Control Panel's icon view and find the Windows 7 File Recovery option there. Once you are in Windows Backup/Windows 7 File Recovery, you can create a system image, back up your libraries, or choose individual folders to back up (image G). These steps can be used to back up other computers to your central storage or to back up your centralized files and folders to another location.

» Another option for backing up critical files in Windows 8 is using the File History feature (image H). File History is primarily used for backing up files from other computers to your centralized storage, but it offers some increased flexibility over traditional backups. File History can be configured by simply choosing the backup location and turning the feature on. In addition to having a backup copy of your files, you also have the ability to open a previous version of a file. This is particularly handy if you've accidentally deleted something contained in a file, such as paragraphs from a document or a slide from a presentation.

» Windows 8 is certainly a shift from previous versions of Windows, but it's not all about the new interface and the start screen. If you know where to look, there are some sweet new features that open up new possibilities in how we use our computers on a daily basis.



Create a Windows 8 Virtual Machine

YOU'LL NEED THIS

A WINDOWS 8 ISO

You can download one if you've purchased Windows 8 from Microsoft, or you can download a free, limited evaluation copy from bit.ly/Po8wWc.

VIRTUALBOX

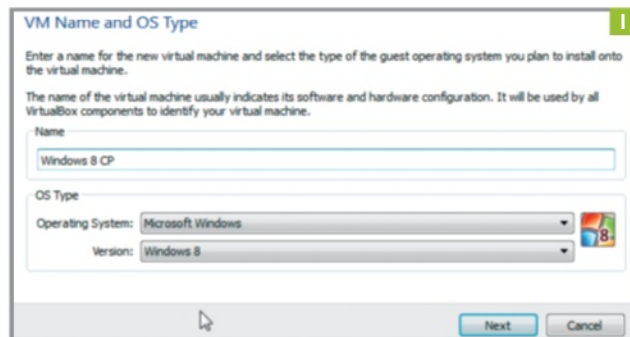
Free virtualization software from Oracle, available at bit.ly/rnbvIM.

VIRTUALIZATION IS an ideal tool for trying out a new operating system. Instead of installing the OS onto a live machine and potentially overwriting or generally screwing up a working system, virtualization lets you run the new OS in a sandbox, leaving your current installation untouched. You'll need a processor that supports hardware virtualization, but as long as your PC is reasonably up to date, this shouldn't be a problem.

In order to run a virtual version of Windows 8, you'll need the ISO. You can buy a copy of Windows 8 from Microsoft, or you can download the evaluation version, which expires and cannot be upgraded. Grab the 32-bit, just because it's less exacting in terms of specs. You'll need the virtualization software for the host machine, as well. For this tutorial we're using Oracle VirtualBox, although the setup is similar for Microsoft Virtual PC (available at bit.ly/19LO5i). —ALAN DEXTER

1 GET STARTED Download VirtualBox and run the installer. When it's done, run VirtualBox, then click New to create a new virtual machine (or VM for short). Give your VM an obvious name like "Windows 8," then select Microsoft Windows as your OS type and Windows 8 from the drop-down menu—or Windows 8 (64-bit), if you've chosen that route ([image I](#)).

» The next screen enables you to define how much memory your virtual operating system should have. Windows 8 has a minimum memory requirement of 1GB for the 32-bit version but we recommend going for 2048MB unless your physical machine is a bit strapped for RAM. Once that's done, click Next.

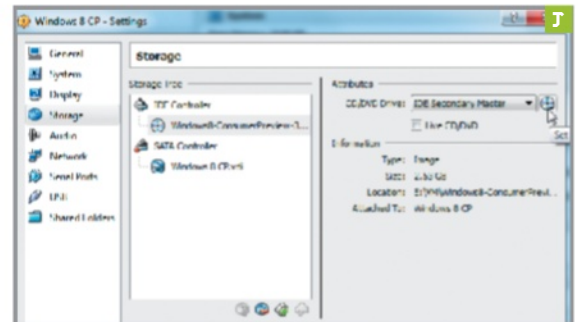


2 CREATE YOUR VIRTUAL DRIVES The next step enables you to define the virtual drive for your installation. Go with the default setting to create a new virtual hard disk. On the next screen, leave the type as a VDI Drive Image—VirtualBox's own file format. It's fine to leave this virtual drive as dynamically allocated, as well.

» Define where you want your virtual disk to reside and change the initial drive size if you feel the need, although the default 20GB default size should be fine. Our Windows 8 installation sat at 7GB. Check that the summary is correct and when you're ready, hit the Create button.

» Right-click Windows 8 and select Settings from the drop-down list. Click on Storage, then click the CD icon under IDE Controller. Click the CD icon to the right of the controller to locate your Windows 8 ISO ([image J](#)) and select "Choose a virtual

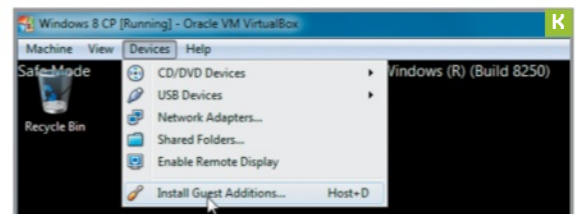
CD/DVD disk file." Point it at the Windows 8 ISO you downloaded and click Open.



3 INSTALL WINDOWS 8 You're now set to install Windows 8 on your virtual machine. Just make sure the virtual PC is highlighted and then hit the Start button. The installation of Windows 8 is fairly straightforward—just be certain you pick a custom installation. Complete the installation and log into your account.

» Installing Guest Additions is a little trickier, as you need to install them in Safe Mode. Go to the desktop view, then hit Windows key + R and launch MSConfig. Click the Boot tab, check the Safe Boot and Base Video options, and then OK the changes, choosing to reboot into Safe Mode.

» Install the Guest Additions from the VirtualBox Devices menu ([image K](#)), enabling full 3D support. Don't reboot. Clear Safe Boot and Base Video in MSConfig, then power off the VM. Increase video memory to 128MB in the Display settings for the VM and enable 3D and 2D acceleration. Launch the VM and you're done. ⏻



Get into Windows if You Forget Your Password

YOU'LL NEED THIS

WINDOWS 7 INSTALL DISC

Using the disc to "repair" your installation gives you an opportunity to change the password.

OPHCRACK

In the event that you don't have an install disc, this password cracker can help you out: <http://bit.ly/zRGei>.

HAVE YOU EVER forgotten your Windows password and locked yourself out of your PC? It's a nightmare, but there are several ways to get back in, depending on the resources at your disposal. We're going to explore the method a professional hacker would use to get into your PC. It's straightforward and uses your Windows 7 installation disc, which contains all the tools you need to get in and change the password.

The technique we'll use contains a real-life hack. We'll replace the Sticky Keys executable with a command prompt, so that even without logging in, we can pull up a command line and change the password, then use it to log in. If you don't have a Windows installation disc, another option is to load up a password cracker. We'll show you how to do that, using the industry-standard Ophcrack.

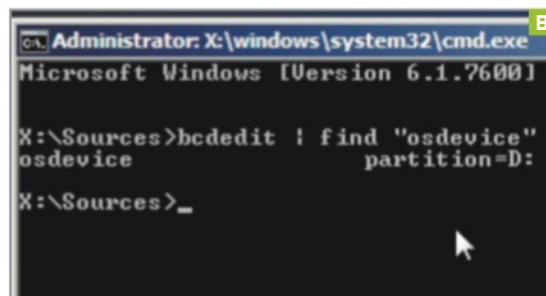
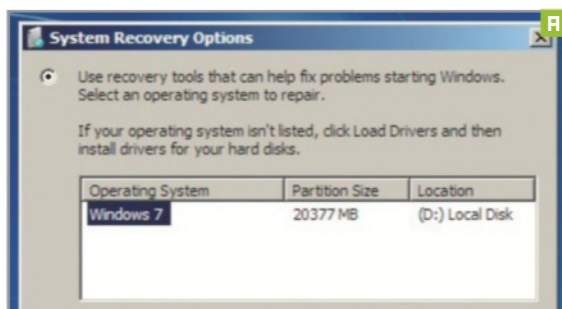
Remember, you should only use these techniques to access a computer that you own. Hacking into another person's machine is a criminal offence. —JON THOMPSON

1 PERFORM THE WINDOWS REPAIR HACK To reset your Windows user account password, you must first boot the computer from the Windows 7 installation disc. With the disc in your optical drive, power on your PC, and when given the option to boot from DVD, quickly hit any key to boot. After Windows loads its installation files, you'll be shown the language setup page. Select your country to set up the keyboard, then click the Next button.

» Click "Repair your computer." The repair software takes a few moments to load from the installation disc, then begins examining the computer's hard disk boot table, looking for any current Windows 7 installations to repair. Unless you've installed many copies of the operating system by hand, there will be just one installation (image A), so click Next to continue the recovery process.

» The resulting screen gives you many options. Click Command Prompt and one appears. The C drive is usually not mounted as C at all. To find its current drive letter, type in **bcdedit | find "osdevice"**. This command results in text ending in **partition=D:** and a drive letter (image B). This is the letter you should use instead of C in the following step.

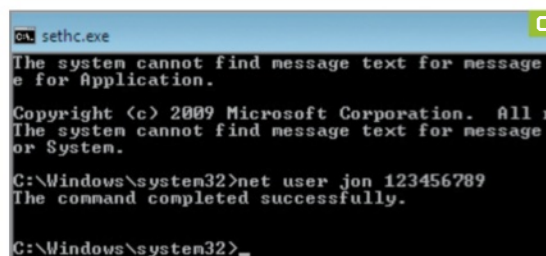
» Enter the following commands. Take care to ensure that you use the correct driver letter in place of C: **copy c:\windows\system32\sethc.exe c:** then **copy c:\windows\system32\cmd.exe c:\windows\system32\sethc.exe**. When prompted, confirm the second command by typing **Yes**. The first command backs up a file, and the second replaces it with the command prompt. As mentioned earlier, what we're doing with this hack is replacing the Sticky Keys application with an executable for the command prompt. Since the Sticky Keys program can be launched at any time (even at the login screen), this will allow us to get command-line access to the system without ever getting past the boot screen.

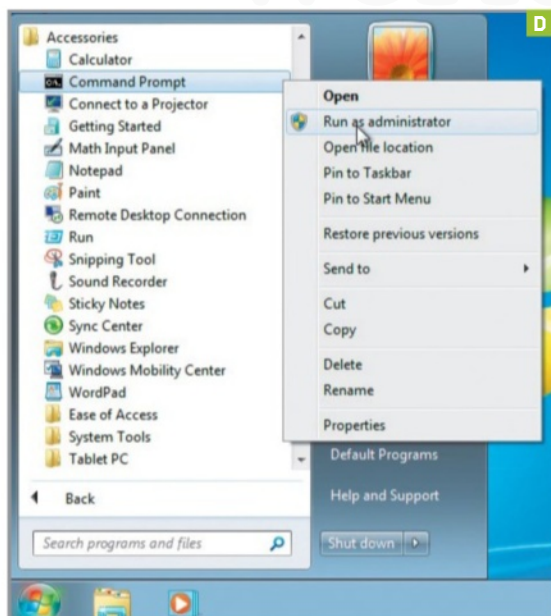


2 CHANGE THE PASSWORD USING THE COMMAND PROMPT

Remove the installation disc and reboot. On the login screen, press the Shift key five times in a row (the Sticky Keys hotkey). As if by magic, a command prompt appears. Enter the following command: **net user <name> <new password>** (image C). Substitute the name of the account to reset and a new password as appropriate. Close the command prompt and enter the new password to log in.

» The final step we must take to restore access is to restore the sethc.exe file we overwrote in Step 1. To do that, click Start > Accessories, right-click Command Prompt and select "Run as Administrator" (image D). This gives you the right to copy sethc.exe back into the system32 folder. Now enter the command **copy c:\sethc.exe c:\windows\system32\sethc.exe**. Confirm the copy to finish.



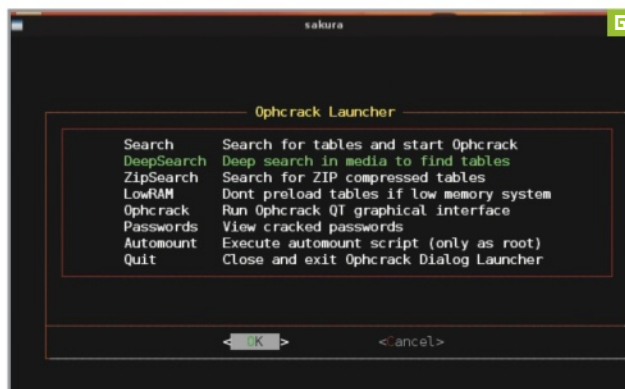
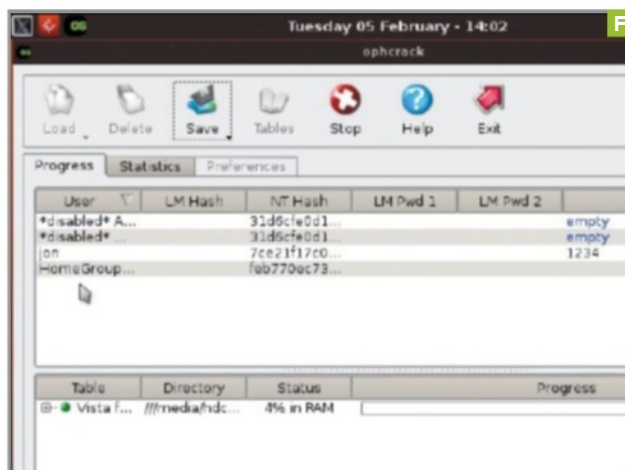


3 CRACK WITH OPHCRACK To crack an unknown password, we need a heavy-duty password cracker like Ophcrack. You can download it from <http://ophcrack.sourceforge.net>. Insert a blank, formatted DVD-RW, then right-click the downloaded image and select "Burn disc image." The disc being written is a bootable live CD containing Linux and Ophcrack.

» Once the DVD has been written, boot the affected computer and the DVD should begin to automatically load the Ophcrack software, which runs outside of Windows. Once done, a menu should appear offering several options for running Ophcrack (image E). Either press Enter, or wait for the timeout and automatically select the Ophcrack graphic mode.

» Short passwords such as "1234" or "password," will fall to Ophcrack almost immediately because the software tries these first in a brute-force attack. Complex passwords take more time, and the longer the password the longer it will take to crack—if it can be cracked at all. A complex password may take several hours to crack. If Ophcrack uncovers the password, it will be displayed in the NT Pwd column (image F). Ophcrack doesn't store the passwords, so make a note.

» Finally, let's perform a deep scan of the whole computer to reveal all passwords associated with Windows user accounts. Close any windows and double-click Launcher. Scroll down to DeepSearch (image G) and press Enter. Ophcrack will search all available media—not just the system volume—for any password files, and then perform its cracking wizardry.



Connect to Your PC from Anywhere with RDP

YOU'LL NEED THIS WINDOWS

The computer that you wish to connect to will need to be running Windows Pro, Business, or Ultimate.

The connecting computer can be running any version of Windows.

A STATIC IP

If you don't have one, you can get the next best thing at www.no-ip.com.

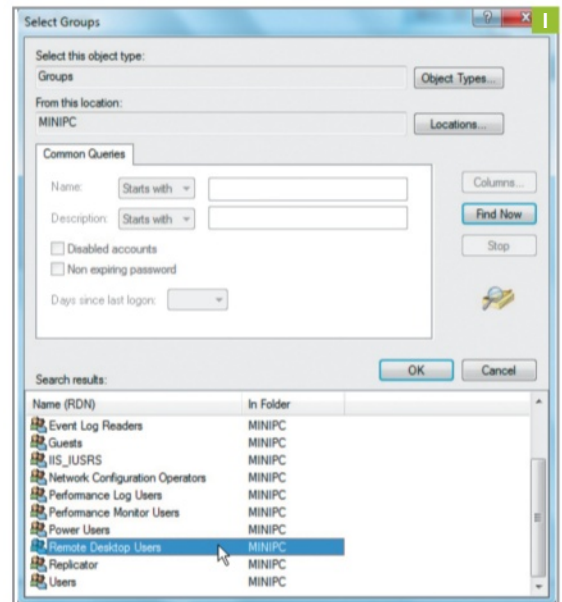
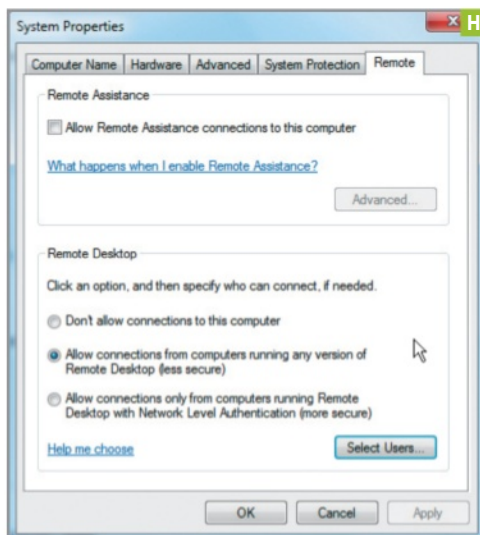
WHAT IS WINDOWS RDP? It's the service that enables you to log into a networked Windows PC remotely as if you were sitting right in front of it. It's a great tool for accessing headless servers, or just for the lazier folks among us who can't be bothered to get up to sort out a PC issue in another room. RDP (remote desktop protocol) is great because it's a standard part of Windows and it's super-fast—rather than streaming the entire desktop image (as services like LogMeIn do), it can get away with capturing just the underlying data structure to recreate the Windows desktop locally. More importantly, Windows RDP ties into the existing Windows Groups and User system. This means it can be made pretty secure. There are some restrictions on the versions of Windows that can instigate an RDP server, but any version can access a running server, so that's where we'll get started. You can use any version of Windows to connect to a PC running Windows RDP service. The issue is that generally only the Pro, Business, and Ultimate versions offer the Windows RDP host service, which is the bit that sends the desktop. If you're running Windows Server—yes, it's unlikely—you're also good to go, but be aware that only one user at a time can see the screen. —NEIL MOHR

SET UP USER ACCOUNTS Before starting anything, we need to set Windows so it'll accept Windows RDP connections. Right-click Computer in the Start menu and choose Properties > Remote settings. In the Remote Desktop section, select the middle Allow... option (image H). The last option will enhance security, but you need the latest Windows updates.

» To add existing users for remote access, click Select Users... and then the Add button, but for extra security consider creating a new user account with restricted permissions. To do this, right-click Computer, select Manage > Local Users and Groups > Users and then Action > New User.

» Anyone can potentially access this over the Internet, so choose a complex username and a strong password. A long, memorable password is better than a short random one, or even a short word with a number and capitalization. Deselect the Change option and tick Cannot Change.

» Create the new user, double-click the entry and click Member of > Add > Advanced > Find Now > Remote Desktop Users to add RDP privileges (image I). You may want to remove this from any other accounts. You can also move them from the Users group to the Guest group for restricted access.



2 PREPARE YOUR NETWORK Before continuing, you should check that RDP and the new user account are working. Jump on another PC or RDP client and try to log in over your home network. Click Start, type **Remote Desktop Connection** and run it, or find it in the Programs > Accessories folder. Enter the remote PC's name or IP address to get going.

» Windows RDP server works over TCP port 3389. For additional security, we'll connect to the router over the Internet to a randomly selected port. The available range of general ports is from 1024 to 65536. Depending on your router, configure it to forward that port to the IP of your PC and to port 3389 (image J). Try www.portforward.com if you don't know how.

» Again, this depends on your broadband router, but somewhere in its interface you'll find the external IP address your ISP has assigned to your router. Try looking in the "Logging" or "Internet" section. You can Google "What's my IP" and the search engine will tell you. If you don't have a static IP then you'll need a DDNS service like those offered by www.no-ip.com.

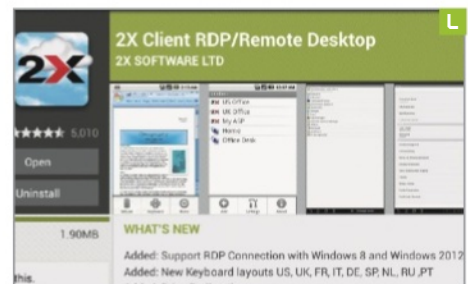
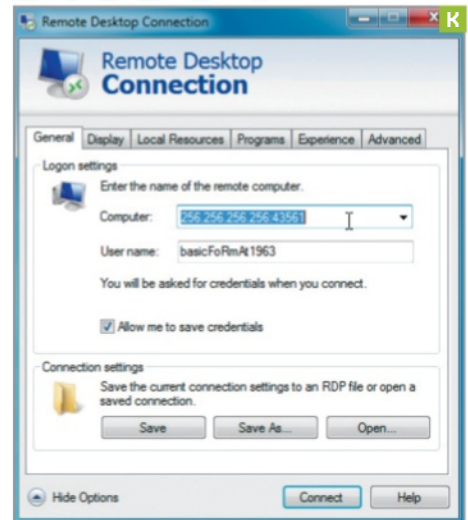


3 CONNECT REMOTELY So, how do you connect to a remote desktop that's using its own port with the Remote Desktop Connection program? Under the Computer section you need to enter the external IP of your router, then a colon, then the port number—all with no spaces. Press the down arrow and you can also add the username, which will be used to log in ([image K](#)).

» Click the Experience tab to see how you can speed up your remote desktop experience. You can leave all the options off, but Visual Styles and Desktop Composition don't slow things down too much. Under Display you can select a lower resolution and reduce the color depth, although this might rearrange your desktop.

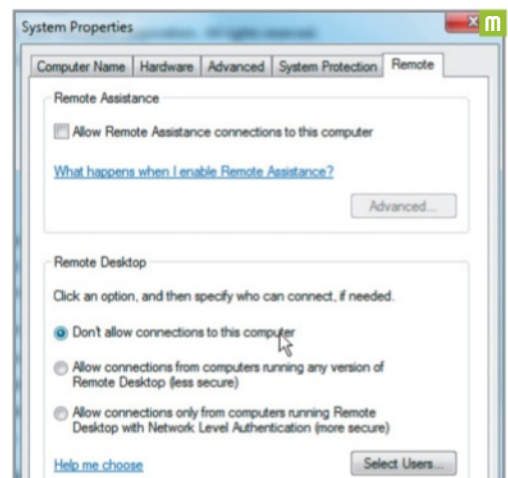
» To really test this out, you'll need access to a connection outside your own home network. For many, the easiest option is to fire up your smartphone and use it to create a wireless hotspot or access the remote system from it directly. Bear in mind that this will connect via the mobile network, so data charges may apply.

» So far we've only talked in terms of access from other Windows systems. But Windows RDP clients exist for all systems including Android and Apple iOS. 2X Client offers free apps (www.2x.com/rdp-client) for a wide variety of platforms ([image L](#)). Download the one that suits your needs and configure it the same way as the Windows one we've covered.



4 TWEAK RDP SECURITY Windows Firewall is pretty comprehensive, and you can restrict RDP access to systems from specific IP addresses. If you know these details, it can be a very secure option. Click Start, type **Firewall**, and select Windows Firewall with Advanced Security. Select Inbound rules > Remote desktop > Scope, and set the IP here.

» If you no longer need external access, there's a level of tidying up that will secure your system again. First, remove the forward port from the router. Second, remove remote access privileges or remove the user from the system entirely ([image M](#)). Finally, if you don't plan to use it, you can remove remote access, reversing Step 2 entirely. ⚡



Safeguard Your PC with Malwarebytes Anti-Malware

YOU'LL NEED THIS

MALWAREBYTES ANTI-MALWARE FREE

A fantastic, free malware scanning and removal suite, available at www.malwarebytes.org.

YOU MAY BE paying for top-of-the line antivirus software, but there's still a chance that it might miss something. That's because antivirus vendors don't share information about new threats with one another, preferring to guard the secrets of their success from potential rivals. So what one product might pick up, another might miss or think is benign.

Because of this, when faced with a potential infection, network security professionals refuse to believe the results of any single antivirus product. For a second opinion, they use scanners designed to fit their needs—and so can you. Malwarebytes Anti-Malware is a tool that's used in the security industry to provide such a second opinion.

We're going to show you how to use it to determine whether there's any cause for concern on your computer and to then perform a deep scan to root out any lurking malware that your normal product might have missed. —JON THOMPSON

1 DOWNLOAD THE TOOL First, install the free version of Malwarebytes Anti-Malware by visiting www.malwarebytes.org and clicking the Free Download link on the homepage. Doing so will take you to the Cnet download site, where you'll find the official executable for download. Click the green Download Now button and save the file to your PC.

» Unless you've opted to store it elsewhere, the Malwarebytes executable will have been saved to your Downloads folder. Double-click the file, which is called Mbytes-setup followed by a version number, to begin installation. User Account Control will appear in a pop-up window to ask if you want to continue. Click Yes and accept English as the installation language.

» The Malwarebytes installation wizard will now appear. Accept the default options by clicking Next until you get to the Install button, and check the box to accept the license agreement. If you don't want to create a desktop icon, or want to change the installation directory, you can do so in this wizard by changing the relevant options. Finally, click Install to continue.

» Once Malwarebytes is installed, leave the options to run and update the software selected. Ensure that your broadband connection is up and running, then click Finish. A progress window appears as the antivirus definitions are downloaded and installed (**image A**), along with any updates to the program itself. Once the process is complete, click OK to continue.



2 SCAN YOUR SYSTEM Performing a quick scan can warn you about any potential problems before you delve deeper. If this option isn't already visible, click the Scanner tab on the user interface. Ensure that Quick Scan is selected and click the Scan button (**image B**). Malwarebytes then begins checking user files, looking for malware signatures. It can take half an hour or more to complete this step.

» When the quick scan is complete, you may notice that Malwarebytes has picked up one or more threats, which it has highlighted in red (**image C**). Don't panic. The program will flag many different objects as suspicious, including benign cookies and installers used by legitimate sites and programs. To see details of the objects it has found, click the Show Results button.

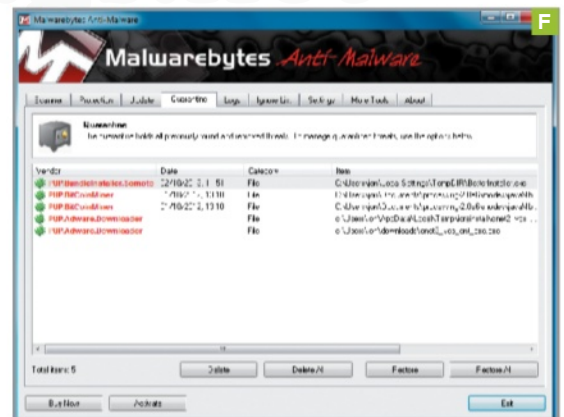
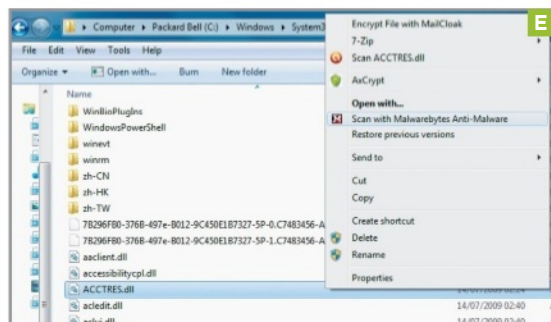
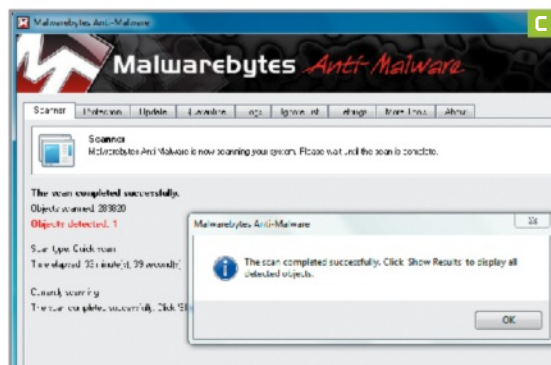
» The detailed results screen provides additional information about the suspicious objects the program has uncovered. Many of these will be PUPS (potentially unwanted programs), and the list can also include legitimate installers and cookies. If you right-click an item you can select "Jump to location." This option opens an Explorer window in the folder containing the suspicious item.

» Right-click the results pane and choose "Check all items." This selects all the discovered threats in one go. To delete them all, simply click Remove Selected. If there are items you know are OK, deselect them by unchecking their boxes individually before pressing Remove Selected, otherwise they'll be erased along with the rest. Malwarebytes will display the result of its actions in a Notepad file (**image D**).

» Malwarebytes adds a menu to Windows Explorer that lets you scan individual files. This will enable you to check downloaded executables before running them. To use this feature, close Malwarebytes and open Windows Explorer. Right-click the file you want to check and select "Scan with Malwarebytes" (**image E**). The user interface will open and proceed as if you were performing a quick scan.

» All the files and other nasties you removed will be sent to a quarantine area (**image F**). You can safely leave them here, or delete them by selecting the Delete All button. By allowing the quarantine area to fill up rather

than deleting potential threats immediately, you can build up a picture of how your regular activities expose you to risks online.



3 KEEP YOUR PC SECURE It's a good idea to schedule your backup to run automatically so the most recent versions of your files are saved. This will protect your data in case a piece of malware manages to get through your defenses. From Windows' Backup and Restore window (in the Control Panel), click Change Settings and set a time that's right for you. Ideally, this should be when your PC is switched on but not being used.

► The activities you've performed so far will have generated a few log files, which you can find under Malwarebytes' Logs tab. Double-clicking an entry opens it in Notepad. Each of these log files contains data about the version of Malwarebytes, along with details of your machine, the time and date of the scan, the options you selected, and a detailed list of the suspicious files detected.

► When Malwarebytes installs, it updates its database with the latest malware definitions. By default, it only notifies you when the database is seven days out of date. This is a long time in PC security. If you want the software to remind you to update the database before scanning, click Settings and set Days to 1 (image G). When you see the update warning, select the Update tab and click "Check for updates."

► Malwarebytes is handy to have around, and is used the world over by computer security professionals who want a second opinion on PC security. It can also give the rest of us peace of mind that our defenses are doing their job online. Though the paid-for version adds more benefits, like real-time protection, the free edition effectively reveals hidden security problems and fixes them quickly.



Encode Videos in Full HD Quality

YOU'LL NEED THIS

A PC WITH SOME MUSCLE

Encoding is a hardware-intensive process. It can take a very long time with an out-of-date computer.

ENCODING SOFTWARE

This process uses a lot of software—see Step 2 for everything you'll need to download.

DESKTOP PCS today are saturated with video. It floods in from all ports, and the scary thing is, the machines seem to take the punishment with ease. Where once we were thrilled to see a quarter-screen VGA video streamed from a CD, we now scoff and roll our eyes if YouTube can't offer 1080p, leaving our eyeballs to endure mere 720p.

With all of this video pouring into your PC, when it comes to storing something—be it a phone clip or a rip from a disc—how do you ensure you get the best possible quality? You could use one of the many one-click-style solutions like Media Espresso, which support Intel's Quick Sync Video.

But we're not going to take that easy route. We're going to look at how serious HD video fiends encode their video. It might not be fast, but it's very clever. Along the way we'll cover downscaling for best effect and how to store high-definition video in a small package that retains all the perceivable detail of the original HD footage. —NEIL MOHR

1 KNOW YOUR CONTAINERS FROM YOUR CODECS Before going into encoding in detail, it's important to know your containers from your codecs. You can skip ahead if you're up to speed, but here's a quick rundown of the ones you'll encounter.

» A container is a special file format that combines multiple files into a single one. For video, this is usually a video stream and audio stream, but it can include multiple audio files, subtitles, and other types on top. The most common containers are MKV, AVI, MP4, WMV, and TS.

MKV: Matroska, widely used online and designed to contain anything.

AVI: Audio Video Interleave, expanded to support DivX/Xvid without subtitles.

MP4: Official H.264 container designed to handle H.264, MPEG-2, and DivX/Xvid.

WMV: Microsoft's container format only supports WMV with WMA.

TS: Transport Stream, which is used by broadcasters and usually uses H.264 video.

» The second part of the equation is codecs—the system used to encode the audio and video streams. The terms used here can get confusing, largely because a number of terms mean the same thing and so end up being interchanged. We'll mention audio now, as there's old-school MP3, Dolby Digital (aka AC3), the rarer DTS, and finally, the best choice: AAC.

AAC: A more recent standard that looks similar to AC3 on paper, but is superior at the same bit rates. There are a number of lossless audio formats based on DTS and AC3, but we won't cover those here.

H.264: A high-definition video standard that's used by most broadcasters. x264 is identical but is the open-source encoder, so files produced with this typically take x264 as their format. AVC—also known as MP4 Part 10, also known as MP4 AVC—is the same.

DivX: A closed-source implementation of the MP4 standard. An open-source-compatible format called Xvid was developed. It's similar to H.264.

MPEG-2: Used for DVD encoding and HD broadcasts in the United States as part of a TS file.

VC-1: The video format used on the defunct HD DVD format and also Microsoft WMV9.

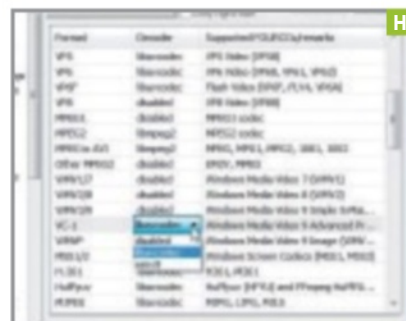
2 DOWNLOAD WHAT YOU NEED For this tutorial we're leaning heavily on the amateur world of high-definition video encoding—the type of everyday genius-level guys who write the x264 encoder, ffdshow, Haali Media Splitter, and all the rest. The only problem is that this involves using a lot of disparate and complex tools to generate professional encoding results.

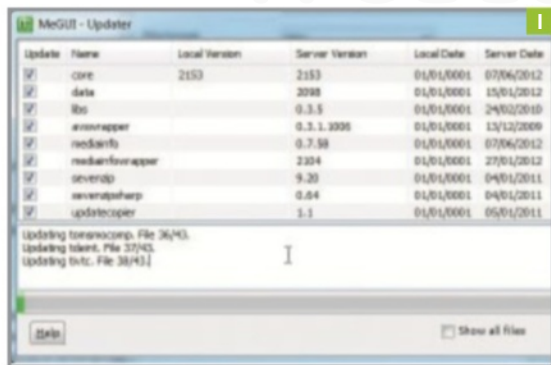
» To begin, we'll get all the tools downloaded, installed, and configured correctly. You may have heard of ffdshow and Haali already. You might have them as part of the CCCP codec distribution, but you'll need to get them again as stand-alone installs. Opt for 32-bit versions. Get Ffdshow from <http://bit.ly/RPbHG4>, and Haali Media Splitter, also known as Matroska Splitter, from www.haali.su/mkv. While you're at it, also grab AviSynth from <http://avisynth.nl>.

» Ffdshow needs a couple of decoding settings defined. Select Start > All Programs > ffdshow > Video Decoder Settings. Look under the Default Codec section and find MPEG-2. Set Decoder to libmpeg2 and VC-1 to libavcodec (**image H**). This ensures that everything you might encounter in this guide is covered.

» Finally, download AvsP from <http://bit.ly/1jMJXRf5> and extract it. We'll need it later.

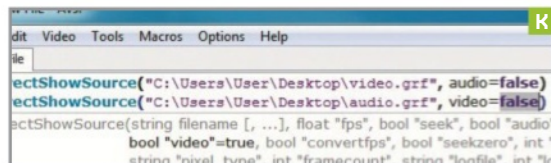
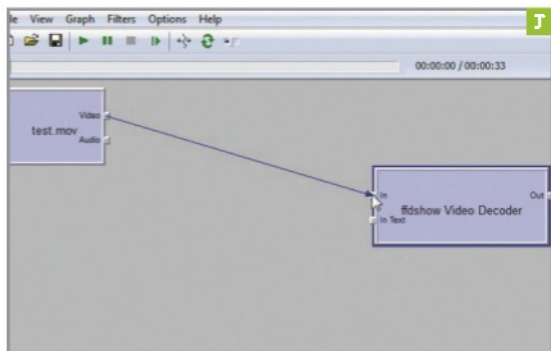
» The de facto encoding tool at the moment is MeGUI, which is based on a comprehensive encoding tool called Mencoder. You can grab this from <http://sourceforge.net/projects/megui>. We suggest you extract and run MeGUI.exe, as it'll need to update itself (**image I**), which can take a little while. The last piece of the puzzle is GraphStudio. Download it from <http://bit.ly/PGsbxp> and extract it.





3 CREATE YOUR GRAPH Fire up GraphStudio, which is a complex bit of DirectXShow voodoo. Select Graph > Insert Filter, under the default DirectShow selection, then double-click Haali Media Splitter, click Browse, and select your video. Now repeat the process, but double-click ffdshow Video Decoder. Two boxes are now displayed in the window. Use your mouse to drag a line from the file's Video pin to the ffdshow In pin (**image J**).

» Select File > Save graph (.GRF) and name it video.grf. Now, delete the two boxes and repeat the whole process, but select ffdshow Audio Decoder and name the graph file audio.grf. Start AvsP, then drag the video.grf and audio.grf files to the AvsP window individually. Just before each closing bracket, add **audio=false** to the video line and **video=false** to the audio (**image K**).



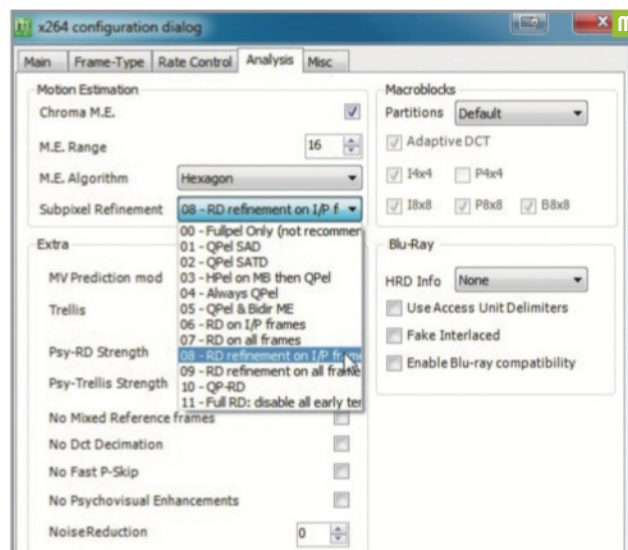
4 WRITE THE SCRIPT At the start of the first line add **vid=**. Add **aud=** to the start of the second line, and on the third line add **AudioDub(vid,aud)**. On the next line also add **ConvertToYV12()**, which adjusts the color space. We're building a script here that AviSynth will run, which is why it seems like programming. Technically, we just need the video, but having the audio also included can be handy.

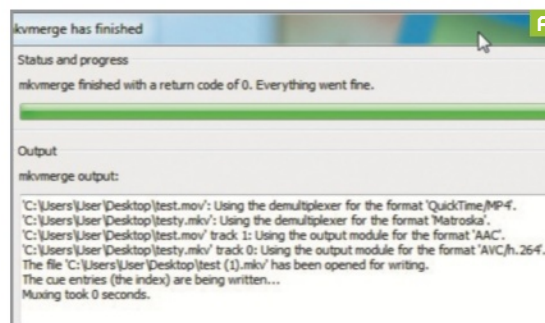
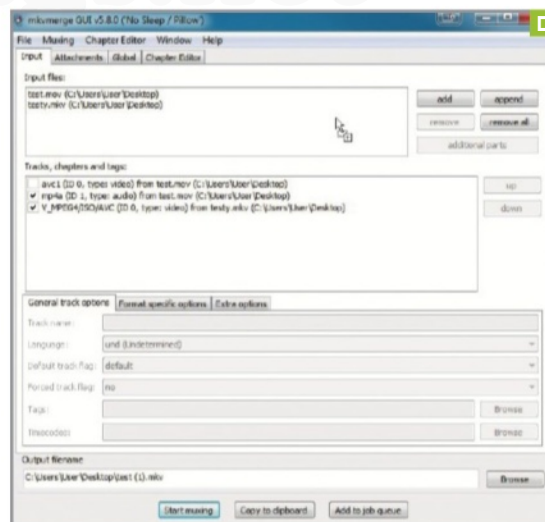
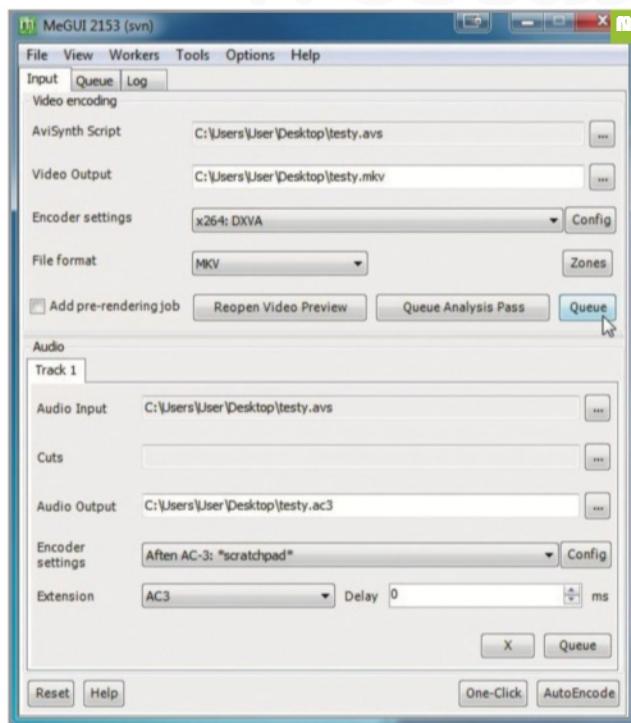
» The script can resize the video to anything you like. Add the line **Spline36resize(x, y)**, with x being the new width and y the new height (**image L**). After cropping, if the width remains 1,920 you can calculate the new height with this equation: (cropped.height/1,920) * 1,280. Round the number to the nearest whole pixel and you should have an aspect-correct image.



5 GET GUI Save the script and fire up MeGUI. This is a complex front-end for the x264 encoder. Under Encoder Settings, make sure x264 is set and click Config. Set AVC Level to Level 4.1, Encoding Mode to Const, and Quality between 18 and 21—18 being best. Tick Show Advanced Setting > Analysis and set Subpixel Refinement to 08 (**image M**).

» Set File Format to MKV and drag your AVS script to the top AviSynth Script box. Check the video output location and name. Click the top Queue button to encode the video (**image N**), and use the bottom button to encode the audio. The video will lack audio—see the next walkthrough to fix that.





6 MUX THE AUDIO BACK IN Let us introduce you to MKV-Toolnix, which you can download from www.bunkus.org/videotools/mkvtoolnix. This tool will enable you to extract and combine all manner of streams within any number of container files. Our aim here is to take the old video's audio and then add it to the new encoded file. This is called muxing. Install and run MKVmerge Gui.

» The muxing process is straightforward—you just need to add the files to the input files section at the top of the screen (image O). As you do this, the various tracks and elements contained within them are displayed as a whole below. Once you've added the two files, deselect everything, then select the video stream from your new MKV file and the audio track from the original file.

» Enter a final output file name and location in the bottom box, then click Start muxing to generate the final file (image P). It shouldn't take long. Once it's finished, test the file and make sure the audio syncs correctly—skip near to the end of the video to check.

» Despite its name, this package doesn't just handle MKV files—it's possible to add a huge range of audio tracks to the Input Files section, from AC3 and AAC to the various DTS tracks. These can then be muxed into the encoded video file. If you're taking this track from MeGUI, then you can be sure that its timing is exactly the same as the encoded video track. ⏻

geeked at birth



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Downgrade to Windows 7

YOU'LL NEED THIS

A WINDOWS 7 INSTALL OR RESTORE DISC

If you bought your PC from a vendor, this should have been included in the box.

AN EXTERNAL HARD DRIVE

You need someplace to store all your data while you're re-installing Windows 7 on your main partition. A USB hard drive, NAS, or jumbo-size thumb drive should do.

WINDOWS 8 takes some getting used to, with its new Start screen and emphasis on full-screen apps. If you've tried your hardest to adjust to the changes with no success, you may be pining for something more familiar.

The good news is that—with a little work—you can downgrade your PC back to Windows 7. As long as you have a Windows 7 install disc (either from Microsoft or from your system vendor) you can follow the step-by-step guide below to ensure that no data or settings are lost.

The guide will work with computers that have been upgraded to Windows 8 from Windows 7, and brand-new PCs where Windows 8 was pre-installed, although there may be some hardware incompatibilities with the latter. Check with your manufacturer for more details. —NICK PEERS

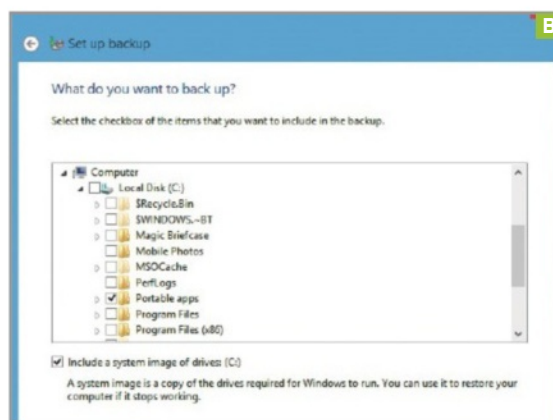
1 PREPARE TO DOWNGRADE First, make sure you have everything you need to install Windows 7. You'll need a Windows 7 install disc, or the recovery disc that came with your Windows 7 system. If you've lost yours, you may be able to purchase replacement discs from your PC's manufacturer.

» You'll also need a large external hard drive onto which you can copy your Windows 7 drivers and program files, and where you can save your backup and fail-safe drive image. Remember, downgrading to Windows 7 will wipe everything from your computer's internal drive, so it's important to make a backup of everything you want to keep.

» Windows 8 includes the same backup tool found in Windows 7, so we'll use this. Move your mouse cursor to the top-right corner of your screen (or swipe from the right-hand side if you have a touchscreen) to access the Charms bar. Select the Search charm and type Windows 7. Select Settings → Windows 7 File Recovery to access the backup tool (image A).

» Select "Set up backup" and wait a moment. When Windows prompts you, leave your backup device selected and click Next. The default option Let Windows Choose should cover most people's needs. If you want to see what's being backed up or specify nonstandard folders to be included in your backup, select Let Me Choose instead (image B).

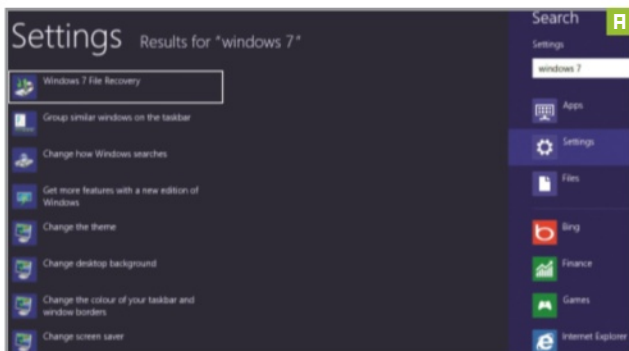
» Whatever choices you make, review the summary and click "Save settings and run backup." Leave Windows to back up your files and create a fail-safe system image. This might take a while, so be patient! If you don't have a Windows 8 installation disc, create a system restore disc just to be on the safe side. You might decide to go back to Windows 8 at a later date.

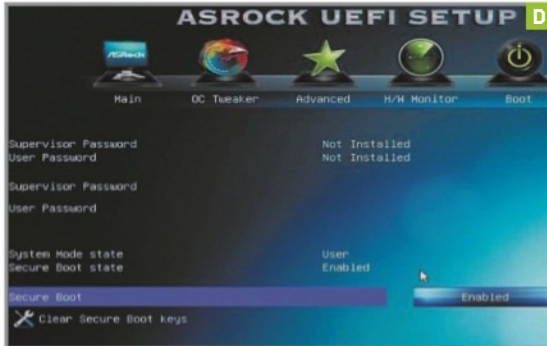


2 TWEAK YOUR BIOS The moment of truth is finally here. Insert your Windows 7 installation or recovery disc in your PC's drive. If you're using a new computer that came with Windows 8 preloaded, you need to make a few changes in your BIOS to configure it to work with Windows 7. If your PC is older and you upgraded it to Windows 8 yourself, you can jump straight to the next step.

» If your PC came with Windows 8 installed, you'll need to tweak a few BIOS settings before you begin installing Windows 7. To do this, select the Settings charm and click Change PC Settings at the bottom. Select General and click Restart under Advanced Start Up. Now select Troubleshoot → Advanced options → UEFI firmware settings (image C) and click Restart again.

» Once your computer has restarted, it will display the UEFI settings page with all the settings required (image D). First, make sure Secure Boot is disabled. You should also consider setting CSM to Enabled and Fast Boot to Disabled. If these options don't appear, contact your PC manufacturer for assistance. Once you're done, save your changes and exit.

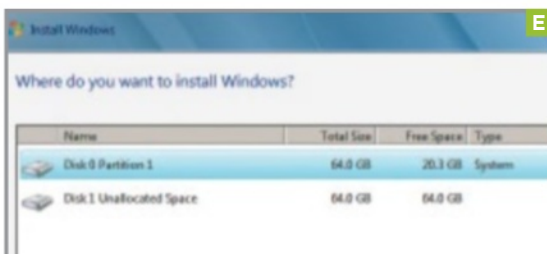




3 REINSTALL WINDOWS 7 Now, restart your computer with the Windows 7 CD inserted in the drive and—when prompted—press any key to boot from CD or DVD. From this point the process will be different depending on which sort of discs you have. If you're reinstalling Windows 7 from recovery discs provided by your PC's manufacturer, the process will be different from the usual Windows installation. Look for a full, destructive recovery option that erases your hard drive completely and select that. Once reinstallation is complete, you should be able to jump ahead to step 4 to finish the process.

» If you're installing from the Windows disc, just go through the normal, brief Windows installation process. When given a choice of install types, select Custom (advanced). Select Drive Options (advanced), then click Disk 0 Partition 1. Finally, select Format followed by OK to wipe the drive before reinstalling Windows 7 (image E).

» Make sure the formatted drive is selected, then click Next and wait a few moments while Windows 7 is installed on your PC. After the first restart, you might be asked whether you want to boot from a CD or DVD—don't do this. Follow the setup wizard all the way through, entering your product key when prompted before completing the installation.



4 RESTORE YOUR DATA Once you find yourself at the familiar Windows 7 desktop, press Windows key + R, type `devmgmt.msc`, and press Enter to see which drivers are missing from your newly restored system (image F). Reinstall those stored on your backup device. If any of them don't work, contact your computer's manufacturer to check for any known compatibility issues.

» After you've reinstalled all your drivers and programs, type **backup** into the Start Menu's Search box and select the option "Restore data, files or computer from backup." Now choose "Select another backup to restore files from" and follow the wizard all the way through, choosing "All files" and "In the original location" when prompted to restore data and settings.

» And that's about it. If you experience any problems during the process, restart using the rescue disc you created earlier, choose Repair Your Computer, and select the option to restore your computer using a system image to recover Windows 8.



Organize Your Media and Watch Live TV with XBMC

YOU'LL NEED THIS

XBMC

Get this excellent media front end for free at www.xbmc.org.

NEXTPVR

This live TV back end can hook into XBMC. Get it at www.nextpvr.com/downloads.

DON'T BE PUT off by the name Xbox Media Center (XBMC)—you don't need a game console to use this fantastic free media software.

XBMC is almost a decade old now, and in that time many tools and handy extras have been developed for it. You can watch YouTube and network videos without having to use Internet Explorer, listen to music through services such as GrooveShark and Pandora, and watch the latest trailers with a dedicated add-on.

Any commercial videos or music on your computer are automatically updated by scrapers, which scour the Internet for information and artwork. This makes organizing your media nice and easy, and gives you a visual guide whenever you play a song or watch a movie.

There are hundreds more features in XBMC, including the ability to record live TV and downloadable remote control apps for Windows Phone devices. It's incredibly powerful and customizable, as well as being easy to use. We'll show you how to get started. —HENRY WINCHESTER

1 DOWNLOAD AND INSTALL XBMC To install XBMC, visit www.xbmc.org and click Downloads at the top of the page. Click Get XBMC and then choose Windows. When prompted to run or save the program, select Run. The XBMC setup wizard will begin. Click Next, agree to the terms, and then de-select anything you might not need on the next screen. Click Next twice more, then click Install.

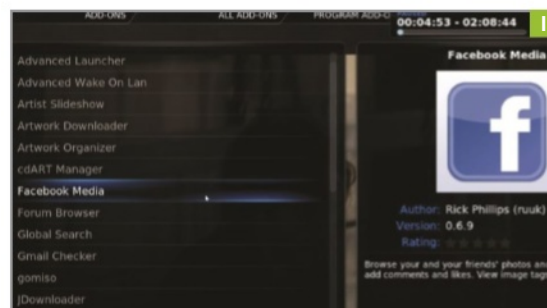
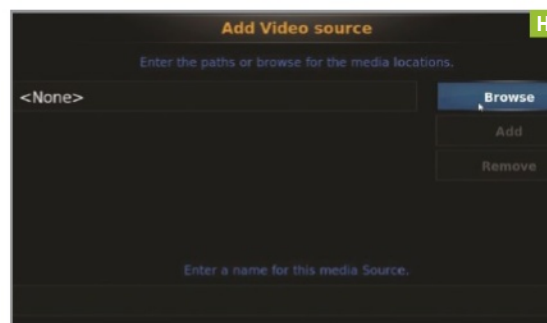
» Once the installation process is complete, click Finish and XBMC should start automatically. You may be prompted to unblock Windows Firewall—click Allow Access if necessary ([image G](#)). You'll now be presented with XBMC's homepage. You can navigate the bar using the scroll wheel on your mouse, the cursor keys on your keyboard, or the arrow keys on a Windows media remote control.



2 ADD MEDIA SOURCES AND ADD-ONS Click each section to add relevant media. To add photos, click Pictures, then choose Add Source. From here click Browse ([image H](#)) and then find the relevant folder containing your pictures—My Photos, for example. Click OK when you're ready. Now, you'll be able to browse through your pictures, using the cursor keys or mouse to move forward and back.

» Add-ons are the lifeblood of XBMC, allowing access to more

features and functionality. Hover over Videos, then choose Add-ons. Click Get More and you'll see an array of different services ([image I](#)). Once you've found one of interest, click Install. When it's installed, go back to the homepage, click Add-ons again, and click the new add-on to view the content.



3 WATCH LIVE TV The one thing that Windows Media Center did really well was enable you to watch and record live TV, and you can do the same in XBMC. In order to do this, you must first have a TV tuner either installed in your PC via PCI or attached externally via USB. Then just connect a TV antenna to it—you're ready to begin the process of watching and recording live TV.

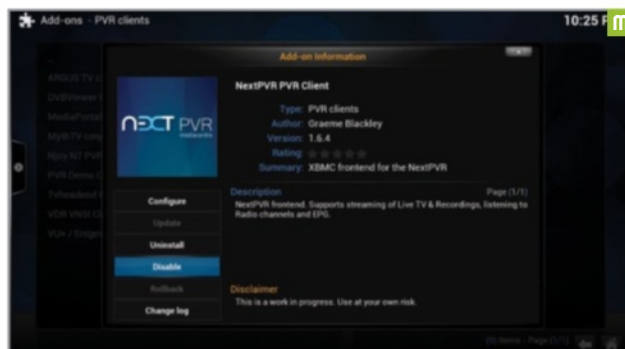
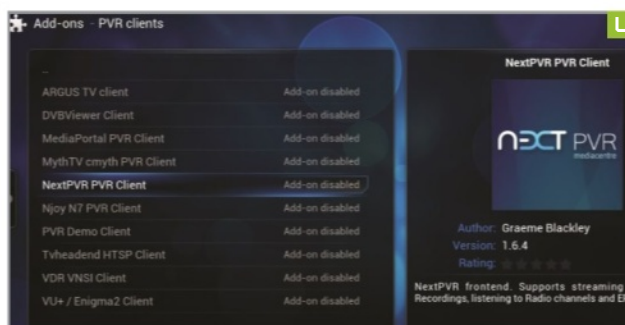
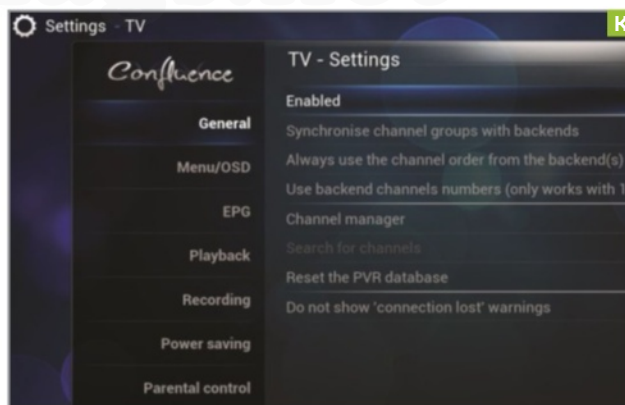
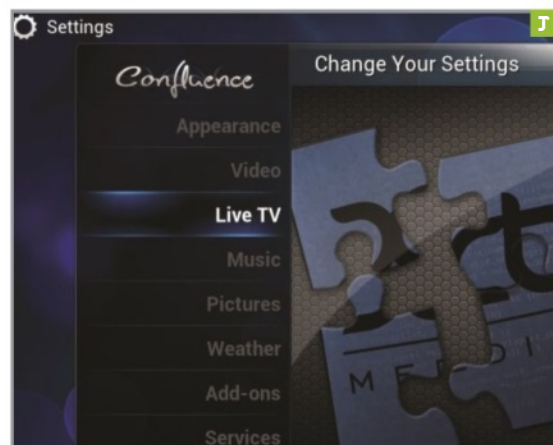
» You need to install the NextPVR back-end, which enables live TV to beam through the XBMC interface. Start by downloading it from www.nextpvr.com/downloads. Once it's open, right-click the interface, choose Settings → Devices, and choose your TV tuner from the list, then hit Configure → Scan to find available channels.

» Now, return to XBMC, go to the main menu (click the Home button if you're not sure where to find this), and select System → Settings. In the left-hand menu, hit the Live TV option (image J). In the menu that appears once you've done this, click the General option. By default, TV is disabled in XBMC, so hit the Enabled setting to activate it (image K).

» Once you've enabled the TV facility, XBMC displays a message telling you that the PVR manager has been enabled but there is no PVR add-on installed, so click OK to be taken to a list of PVR clients, which will enable you to watch and record live TV. There are lots to choose from, but we've gone for NextPVR PVR client, so click this to get started (image L).

» Once you've selected this, a new window appears, giving you more information about the client (image M). To get NextPVR working, hit the Enable button in the list of options to the left. You can click Configure to change some of the other settings, but there's no need to make any major alterations to the standard setup before you start watching TV.

» That's it. When you go back to the main menu in XBMC, you'll see that a new option has appeared called Live TV. When you hover your mouse over this, another menu appears, giving you the option to watch TV channels, look at your EPG (episode guide), and even record broadcasts at specific times. There's no need for Windows Media Center after all! ⏻



Create a VPN Server

YOU'LL NEED THIS

TWO WINDOWS PCs

You won't need any special software for this guide, but you will need two computers running Windows 7 or 8—one to act as a server, one as a client.

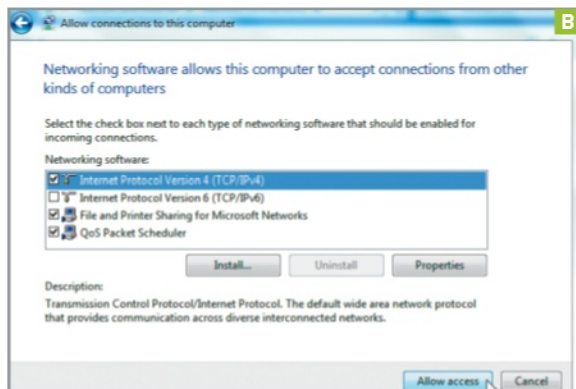
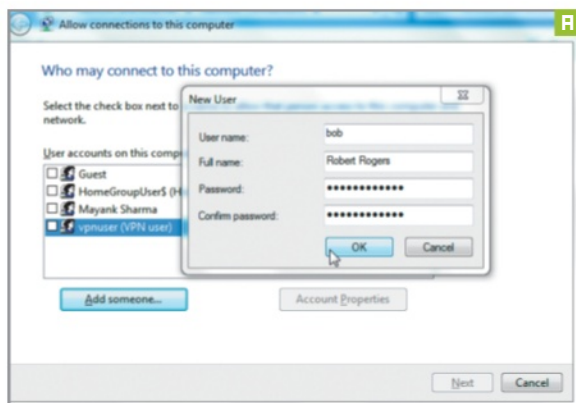
USING A VPN—or virtual private network—you can remotely connect to a private network from an unsecure public network, via secure virtual “tunnels.” VPNs are primarily used by businesses to allow their employees to connect to the office network from home—but it also has interesting applications for casual users. For example, you can use it to access your computer at home and watch region-locked TV streams.

Setting up a VPN can require some serious system administration skills and dedicated networking tools, but Windows 7 comes with everything you need to set up and configure your PC as a VPN server—as well as the tools to connect to it as a client. That said—as with any network software—the process of setting up a VPN server requires knowledge of your network infrastructure at home. It may sound daunting, but we'll walk you through it. —MAYANK SHARMA

1 PREPARE YOUR USER ACCOUNTS We'll start by setting up the machine we want to access remotely. First, we need to create a new incoming connection. Click Start and type **view network connections** in the Search box. Click any option to open the Network Connection window. Press the Alt key, open the File menu, and select New Incoming Connection....

» You'll be shown a list of all the users on this machine. Select the user account you wish to be able to connect to from a remote computer. Since existing user accounts may have administrative privileges, you should create a new user with limited privileges specifically for accepting VPN connections. Click Add Someone... and specify the account details of the new user (image A).

» Click the Next button after adding a user. Then select the Through the Internet checkbox, which defines how people will connect to this machine. Next, you'll be shown a list of network services that will be enabled for remote users. You can now proceed with the default options, or remove access such as “File and printer sharing” if you don't want remote users to use them (image B).

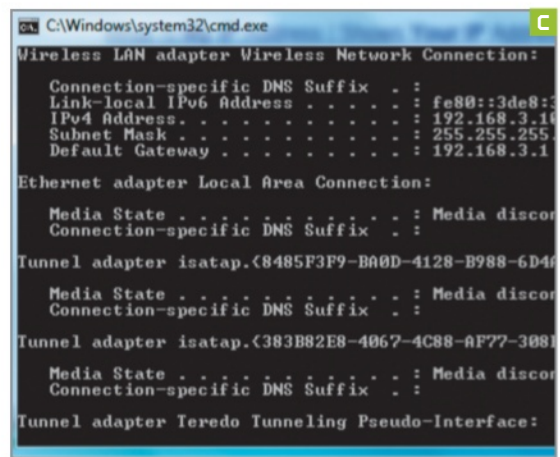


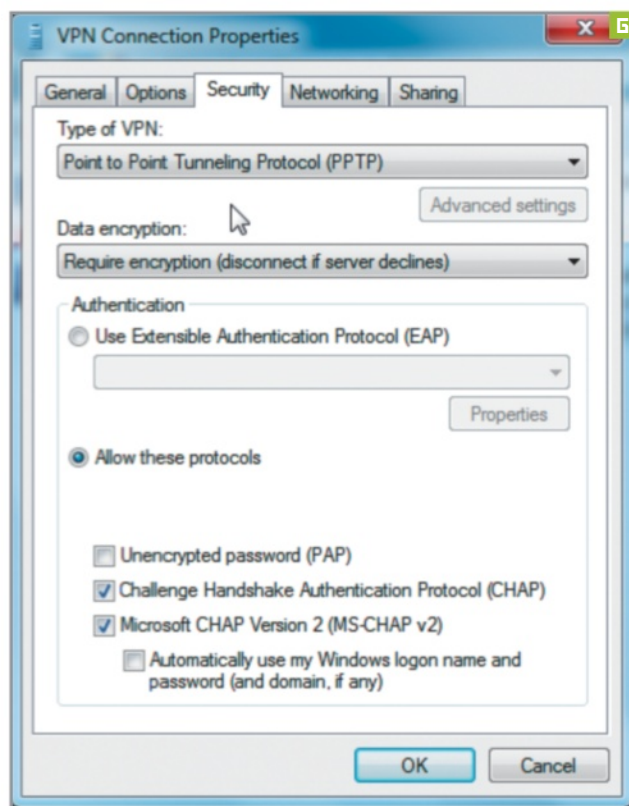
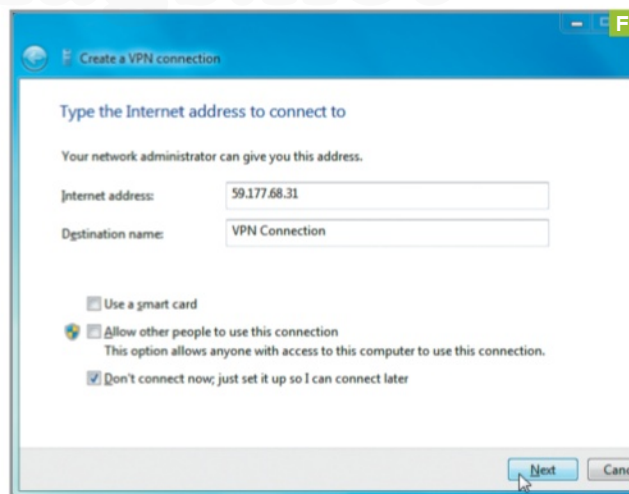
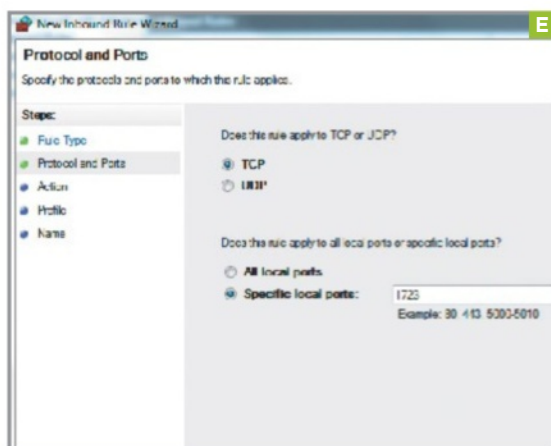
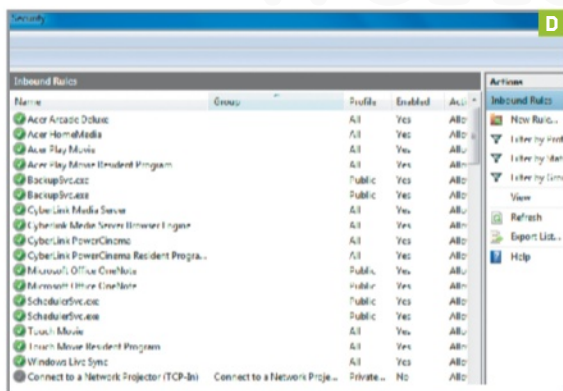
2 CONFIGURE THE VPN SERVER To allow VPN connections, you need to check your router and Windows firewall. For that you need to know the private and public IP addresses of the Windows VPN server. Click Start and type **cmd**. In the terminal window that opens, type **ipconfig** and note the address listed in the line starting with IPv4 Address (image C). To find the server's public IP, go to www.google.com and search for **my IP**.

» To ensure Windows Firewall doesn't block VPN connections, we need to configure it. Begin by clicking Start → Control Panel and type **firewall** into the search box. Click Windows Firewall, then click Advanced Settings in the left-hand pane. You might be prompted for your Administrator password before Windows launches Windows Firewall with Advanced Security.

» Using this dialog box, you need to add a new rule to allow traffic on the VPN port 1723. In the left-hand pane click Inbound Rules and then in the right-pane click New Rule (image D). Next, toggle the Port radio button on the wizard screen. In the next step, toggle the TCP option and then enter the VPN port number in the space provided (image E). Use the default options for the rest of the wizard.

» Now, it's time to configure your router to forward connections from the Internet to the server. The instructions for this step depend on your router. Check www.portforward.com for router-specific information. The two things you need to know to are the VPN port number (1723) and the private IP address of the server that you found above. The server is now set up!





3 CONNECT WITH A CLIENT MACHINE When you want to connect to the VPN server from a remote location, you need to first create a new connection on the client machine. Go to Start and type **vpn** in the search box and select the first option that comes up. In the dialog box that appears (image F), type in the public IP address of the VPN server and give it a name. Don't forget to select the "Don't connect now" checkbox.

» You'll then be prompted for the credentials of the VPN user you set up in step one. The new VPN connection will now be listed next to other regular connections in the Network Connection window. Right-click this connection and select Properties. Now, switch to the Security tab and select the PPTP option from the Type of VPN drop-down menu and click OK (image G).

» That's it! You can now double-click this new connection, enter the password for the VPN user, and click Connect. You'll then be connected to the remote VPN server. On the VPN server, you can see the number of connected users in the Network Connection window. To disable VPN access to the server, simply right-click the Incoming Connection item and select Delete.

Investigate System Hang-Ups with Process Explorer

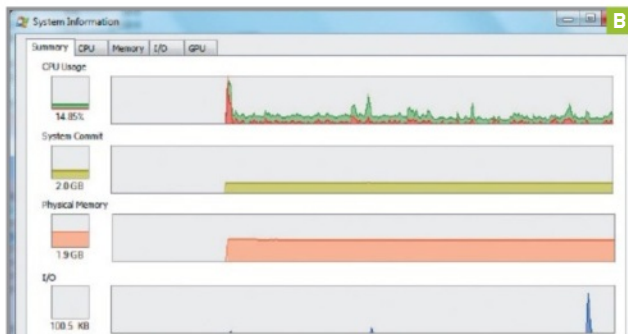
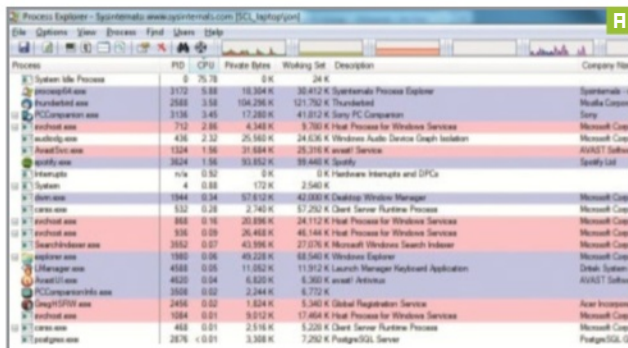
YOU'LL NEED THIS PROCESS EXPLORER

A more powerful alternative to the standard Task Manager, Process Explorer is available for free at <http://bit.ly/G1yDL>.

1 GET STARTED The first step is to get Process Explorer, which you can find at <http://bit.ly/G1yDL>. It doesn't need installing, so once you've downloaded it, you can easily carry it with you on a USB stick to diagnose problems on other people's PCs. Click Download and a zip file opens. Create a folder somewhere convenient and drag the rocxp.exe file into it.

» To get a good look at the system scheduler, we need to run Process Explorer with Administrator rights. To do so, right-click the procexp.exe file and select Run as Administrator. A security pop-up will appear, asking you to confirm your decision. Click Yes and the main Process Explorer interface will appear (**image A**). Maximize the window to see the most system information.

» Click View > System Information and a window pops up showing current resource use (**image B**). There are several tabs, which give overviews of different parts of the OS and its processing hardware. On multicore systems, you should see multiple traces—one for each core.



ALL MY APPLICATIONS are closed, so why is my PC's fan suddenly blowing like an asthmatic elephant? Something is driving the processor hard, but what could it be? Have my antivirus defenses been breached? How do I find out what's going on?

Deep at the heart of Windows lies the system scheduler. Easily the most complex and busy part of the operating system, this lump of impenetrable code controls access to system resources. It's the best place to see what's happening and whether it's legitimate. For serious investigation, though, the built-in Task Manager isn't enough. We need something with more precision and scope.

We need the free Process Explorer tool by Mark Russinovich. This Microsoft-supported stand-alone program is exactly what we want to delve safely into the heart of the operating system. —JON THOMPSON

2 INVESTIGATE PROCESSES If CPU use seems high, Process Explorer can tell you which application is hogging it. On the main screen, click CPU and the display sorts itself by the amount of CPU time taken. Processes should pop to the top of the list for a few seconds each. If a process stays at the top, this indicates high CPU use.

» Click the Process heading to see which processes are running. Scroll to the bottom of the display to see those started under Explorer—highlighted in pale blue. These are the applications you're currently using, and the background processes that are started when you log in.

» Right-click a running process and select Properties. This brings up a window containing a detailed view of the process, split into several tabs. The performance graph (**image C**) is great for telling you if the process is taking too many resources and whether that use is increasing. Steadily mounting memory use might be a sign of memory leakage (taking memory, but not giving it back when finished with it).

» Process Explorer has a handy way of identifying a running process. First, bring the application in question to the front of your desktop. Next, in Process Explorer, drag the target icon at the top of the interface onto the application in question. This temporarily minimizes Process Explorer and displays the application you selected. Drop the icon over the application and its process will be selected in Process Explorer.

» When a new process begins, it can be hard to spot it in Process Explorer's list. To make new processes easier to find, click View > Scroll to New Processes. When a new process begins, the display will then scroll to it and highlight it for you in green. Uncheck the option to switch off this feature when you want a more stable display.

» Some malware connects to the outside world, and we can find out which websites it's linking to. Right-click a process and select Properties. On the resulting window, click the TCP/IP tab (**image D**). Ensure that the "Resolve addresses" button is ticked and expand the headings to see the websites being connected to. Do they look dodgy? If so, it could be time for a full system scan.

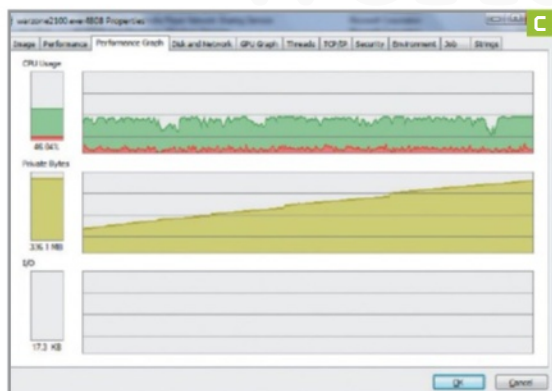


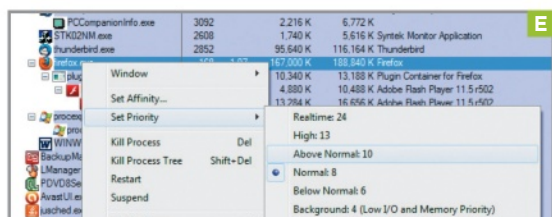
Figure D: Process Explorer Performance tab, Active addresses list.

Port	Local Address	Remote Address	State
TCP	scd_laptop:5176	scd_laptop:12000	ESTABLISHED
TCP	scd_laptop:5177	scd_laptop:12000	ESTABLISHED
TCP	scd_laptop:5178	scd_laptop:12000	ESTABLISHED
TCP	scd_laptop:5179	scd_laptop:12000	ESTABLISHED
TCP	scd_laptop:5184	scd_laptop:12000	ESTABLISHED
TCP	scd_laptop:5187	scd_laptop:12000	ESTABLISHED
TCP	scd_laptop:5191	scd_laptop:12000	ESTABLISHED
TCP	scd_laptop:1111	scd_laptop:1112	ESTABLISHED
TCP	scd_laptop:1112	scd_laptop:1111	ESTABLISHED
TCP	scd_laptop:5124	www.slb-10-03-fc1.facebook.com/https	ESTABLISHED
TCP	scd_laptop:5125	46.33.75.106/https	ESTABLISHED
TCP	scd_laptop:5128	a23-62-2-57.deploy.akamaitechnologies.com/https	ESTABLISHED
TCP	scd_laptop:5129	a23-62-2-57.deploy.akamaitechnologies.com/https	ESTABLISHED
TCP	scd_laptop:5130	46.33.75.106/https	ESTABLISHED
TCP	scd_laptop:5131	46.33.75.106/https	ESTABLISHED

3 TWEAK, KILL, AND RESTART PROCESSES If you have a game or another demanding application running, you can boost its priority in the system scheduler. To do so, right-click its process and select Set Priority (image E). Applications are normally set to Normal, but increasing this to Above Normal will increase its availability to the CPU. Don't be tempted to set priority to Realtime or you may lock up the system!

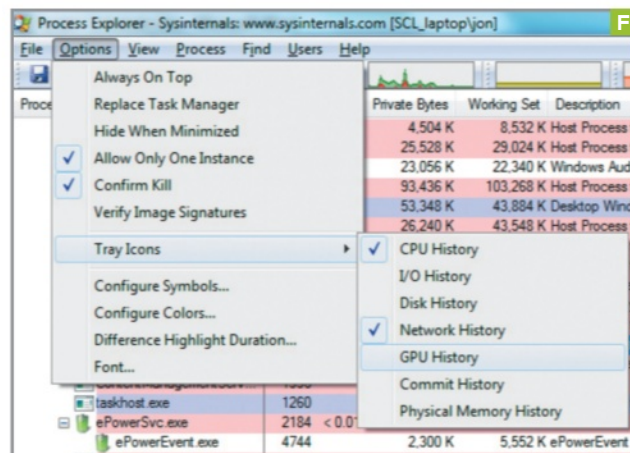
» There's nothing worse in Windows 7 than a process that suddenly "ghosts out" and the dread words "Not responding" appear in its window title. Instead of simply killing it or waiting for it to die, you can try restarting the process. To do so, find it in Process Explorer, then right-click it and select Restart. This will tell the scheduler to free the process's resources and start again.

» On a multicore system, a process that uses 100 percent CPU will usually do so using only one core. The others are free to run Process Explorer, so you can still kill the offending code and free up the system to reboot it properly. Right-click the process and select Kill Process. Confirm that you want to kill it and the process will end.



4 EXPLORE OTHER FEATURES When Process Explorer is running, you'll see a small graph of CPU use in the system tray of the Windows taskbar. You can add other graphs here for handy reference by clicking Options > Tray Icons and selecting what you need (image F). Note that these only appear when Process Explorer is running. If you hover the mouse over a graph, you'll be presented with more details.

» Having delved into your running operating system, it's very useful to make sure that nothing has tampered with an application's code. To do so, right-click the application and select Properties. In the Image tab (image G), click the Verify button. If the producer is available, this will compare the .exe with a check code and the word Verified will appear next to the vendor's name.



Get Started with Screencasting

YOU'LL NEED THIS

CAMSTUDIO

A screencasting application, free at <http://camstudio.org>.

WINDOWS MOVIE MAKER

Microsoft's basic video-editing software, free at <http://bit.ly/GUE3tv>.

AVIDEMUX

A video editor with advanced features, free at <http://bit.ly/Tdyv>.

SCREENCASTING is simply the process of recording what's happening on your desktop, talking over it, and sticking it up on a video-sharing website. It's actually a very useful thing to be able to do, particularly if you're trying to show the great unwashed masses (i.e., everyone else) how to do something in Windows. Want to show your folks how to uninstall their printer drivers, install virus protection, or some other bit of advice? Send them a link to a YouTube video and you're done.

Screencasting is also really useful for recording games that don't use DirectX, such as Magic the Gathering Online. There's a small community of players that record their drafting experiences and share them with the world over at www.draftmagic.com, and by following this guide you could potentially join them—as long as you've got something to add, of course.

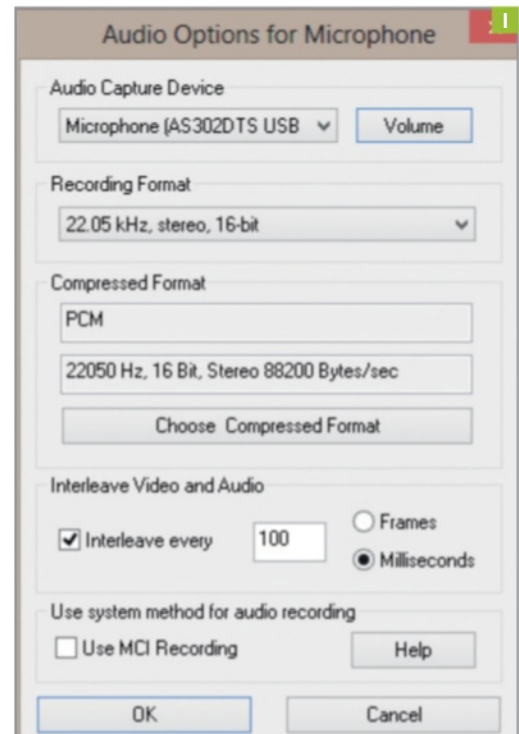
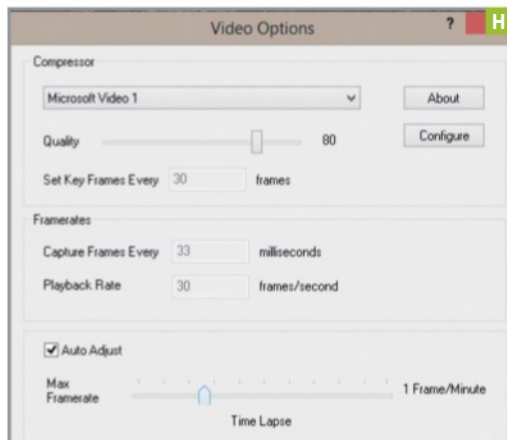
There are plenty of commercial programs that will record your desktop, but our goal here is to do it using free software. Partly because we're cheapskates, but also because it seems silly to spend a small fortune on software that you might not use more than a couple of times. Here's how to start. —ALAN DEXTER

1 CONFIGURE CAMSTUDIO Download CamStudio Recorder from <http://camstudio.org>, then install and launch it. Before you hit that big inviting record button, configure the recording options. Select Video Options ([image H](#)), set the Compressor on Microsoft Video to 1, and leave the rest of the options untouched—unless you don't need smooth video (for a training video, for instance), in which case use the slider at the bottom.

» Next, configure your audio. You'll find settings under the same Options menu. Select the source that you'll be using—usually the Microphone settings—and set the volume if you can ([image I](#)). You may need to set this using the Windows utility if this doesn't work. We'd suggest running a quick sound test to make sure the audio isn't too quiet.

» Go to the Options menu again, look under the Program Options entry, and make sure "Save settings on exit" is highlighted. Next, check the option "Do not play AVI file when the recording stops," select your own directory for recording your videos, and opt for the program to ask you for a file name under the Name of AVI file option.

» Finally, make sure the Region option is set to Full Screen (we'll show you how to crop in on specifics later) and that the Automatically Stop Recording option is turned off. You're now ready to start capturing your screen. Be warned, the resultant videos can get huge very quickly—you're looking at 1GB for seven minutes on a 1080p screen.



2 PERFORM BASIC EDITING One tip we'd suggest is that you allow time to breathe before you start recording—a pause that can easily be removed at the editing stage. So, hit the record button, get your windows in the right places, make sure everything is good to go, and then start your narration and actions. Do the same at the end, as well.

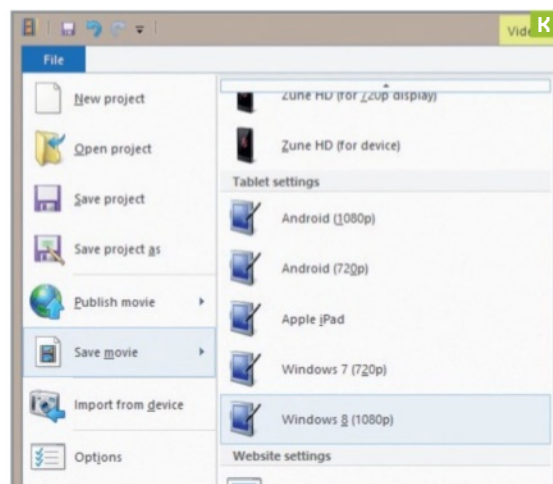
» The next stage is to pull your movie into Windows Movie Maker (available for free at <http://bit.ly/GUE3tv> if you don't already have it) for basic conversion and cropping of any fluff at the start and end of your recording ([image J](#)). Begin the pro-

cess by locating where you want your recording to start (that is, after you've hidden the CamStudio Recorder). Be mindful of when your audio starts, as well.

» You can use the fine-step keyboard shortcuts of “J” and “L” to step through your recording to find the start point. Once there, click the Edit tab and hit the Set Start Point button. Repeat the process for the end—this might just be cutting out the bit where you stop CamStudio recording, but it's worth doing this right.

» Once you've cropped your video, you should save it in a more storage-friendly format. Select Save Movie from the File menu and pick Windows 7 (1080p) or (720p) depending on the resolution of your screen (**image K**). Save it somewhere sensible, and make sure the file type is set to MPEG-4/H.264 Video File and not Windows Media Video File.

» The actual conversion can take a little while to complete, but once finished you should find that the movie is roughly a tenth the size of the original. Play it back to make sure you haven't lost any information or introduced any oddities. If you have, just go back to the original file and be a little more careful in the cutting.



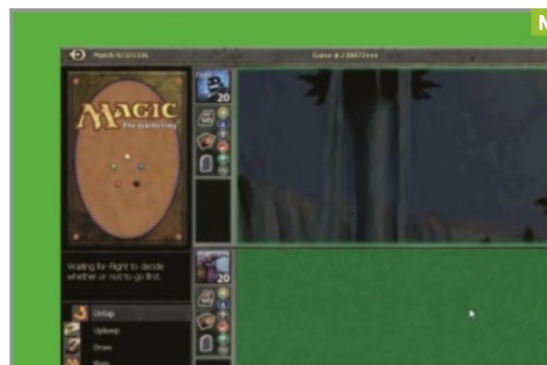
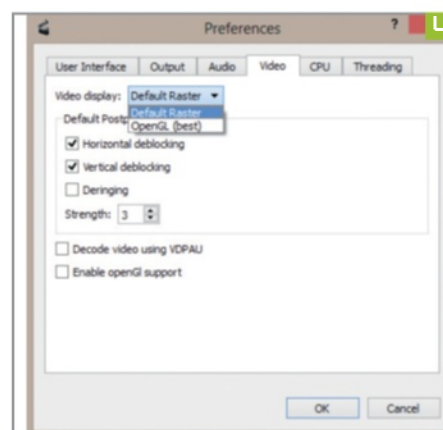
3 DO ADVANCED EDITING The main reason we passed the video through Movie Maker is to deal with format incompatibilities in Avidemux. However, if you want to do more than simply cut off the beginning and end of your movie, it's worth working with Avidemux's idiosyncrasies. Install the program from <http://fixounet.free.fr/avidemux>, then run it, drag your movie into the editing area, and hit Play to make sure all is well.

» If Avidemux crashes when you try playing your video, go into the Preferences screen from the Edit menu and select Default Raster for the Video display method under the Video tab (**image L**). This is a known issue, but easily remedied. Restart Avidemux, open your video, and hit Play—it should now play without issue.

» One of the best features offered by Avidemux is its support for filters. These filters provide different ways of changing your video—from cropping in on certain areas to removing noise to swapping colors to adding subtitles. Open the Filters screen (**image M**) from the Video menu and highlight the Transform group on the left-hand panel.

» In our movie, we have a lot of excess space around the main window we're talking about, so we simply crop it out. Just enter values in the left, right, top, and bottom boxes—the area that's cropped out will be colored green (**image N**). You can drag the timeline just above the video image to make sure you've got it right.

» Set the format for your video under the Video Output option to MPEG-4 AVC (x264) and configure the Encoding Mode to be Average Bitrate (Two Pass). Set the Output to MP3 (lame) and then hit the Save Video button to create your edited, cropped film. Finally, log onto YouTube, upload the video, and bask in the fame and adulation. ⏻



Install Windows 8 from a USB Drive

YOU'LL NEED THIS

A USB DRIVE

You'll need at least 4GB of space to install Windows 8.

A WINDOWS 8 ISO

You can buy one online at bit.ly/TELHzY or burn one from a Windows 8 install disc.

1 PREPARE A USB KEY (THE FAST WAY) If you shun DVDs, love speedier installations, have a digital download of Windows 8, or just plain don't have an optical drive, then it's going to be a USB-based installation for you. And that's just fine; it's a great, quick way to get an operating system onto your hard drive.

» The easiest way to accomplish this process is to already have your hands on a copy of Windows 8's downloadable .iso file—acquirable by purchasing it from Microsoft itself. If you have a flash drive of the appropriate size (at least 4GB or greater, depending on whatever file Microsoft lets you grab), you're golden. Insert your flash drive into a USB slot on your system, and then go grab Microsoft's ill-named Windows 7 USB/DVD Download Tool (<http://bit.ly/18CVjyg>).

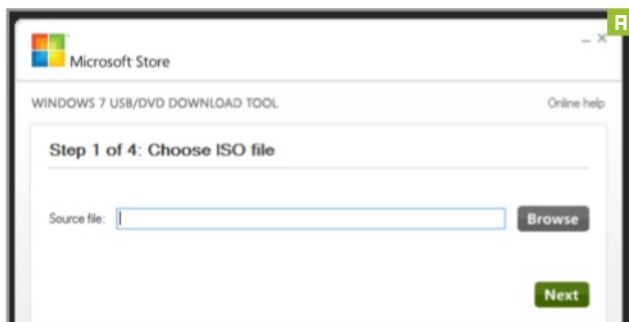
» Install the app and run it. It'll ask you to select an .iso file to be "burnt" onto your USB key (**image A**). Go ahead and select your Windows 8 .iso file—the fact that it's not the same OS as the tool's name has absolutely no bearing on what you're doing.

» On the next screen, you'll be asked whether you'd like to create a "Windows 7 backup"—again, ignore the name—on a USB device or DVD. Pick the obvious answer, select your USB key from the drop-down menu (**image B**).

When you're ready to let 'er rip, click "Begin copying!" If the tool needs to format your USB key first, it'll let you know. Couldn't be easier, right?

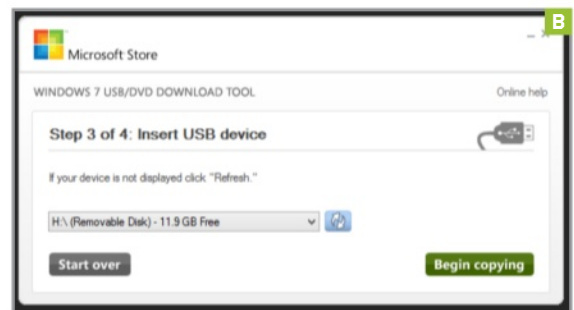
» Sometimes, however, the Windows 7 USB/DVD Download Tool mucks up—it might tell you that the .iso file you're looking to "burn" isn't actually a recognizable .iso file. You know it is; the Windows tool disagrees. That's a problem.

» There are a number of ways around this problem, but the most simple is to do what the Windows 7 USB/DVD Download Tool is doing, by hand. We'll show you how.



OVER THE YEARS, Microsoft has made the Windows installation process pretty painless. Once you've set the install application running, it's off to the races: You can sit back, enjoy a nice beverage, and let Microsoft's fantastically efficient OS installation routine do all the work. By the time your Windows 8 OS needs your input, you're practically finished—just a few short steps, if not minutes, away from the tiled joy that is Windows 8 proper.

So, what does that leave us to talk about? Plenty. Ditch your discs, because we're going to show you how to install Windows 8 from a USB key. —DAVID MURPHY



2 MANUALLY PREPARE A USB KEY Start by using a freeware app like Virtual CloneDrive (bit.ly/zS4p) to mount your downloaded Windows 8 installation .iso to a virtual drive within your current Windows OS. Alternatively, insert a Windows 8 DVD into your optical drive.

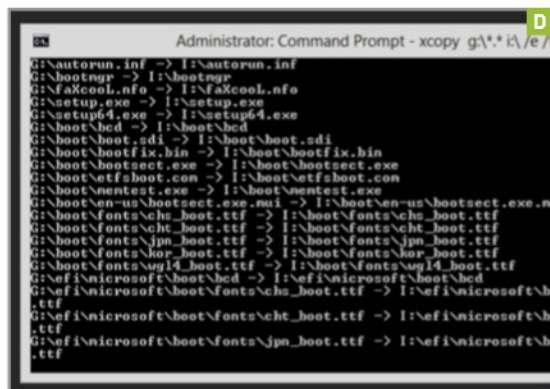
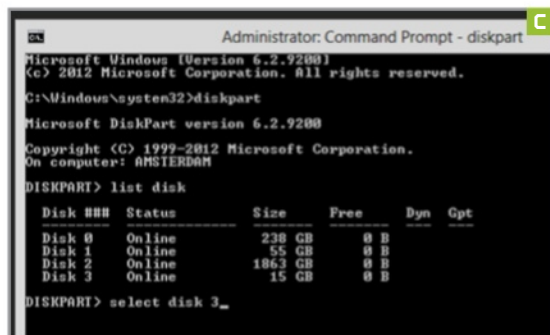
» Next, insert your USB key and fire up a command prompt as an Administrator. Within the command prompt, load Windows' built-in Disk Partition utility by typing `diskpart` and hitting Enter.

» Within the Disk Partition utility, you'll want to start out by typing `list disk` and hitting Enter. From there, write down the drive number that corresponds to your flash drive—you'll be able to tell, as the capacity of the listed drive should match the capacity of your USB key (**image C**).

» Next, type `select disk #`, where the pound sign is the drive number of your USB key that you just noted. Hit Enter—DiskPart will select the aforementioned drive. Now, type `clean` and hit Enter to remove any existing partitions that might already be on your flash drive. Once the cleaning process is done, type `create partition primary` and hit Enter to do just that. Type `select partition 1` and hit Enter to select your new partition, type `active` and hit Enter, and then type in `format FS=NTFS quick` to quickly reformat your partition with the NTFS filesystem. Type `assign` and hit Enter, and you'll have finished making your USB key bootable!

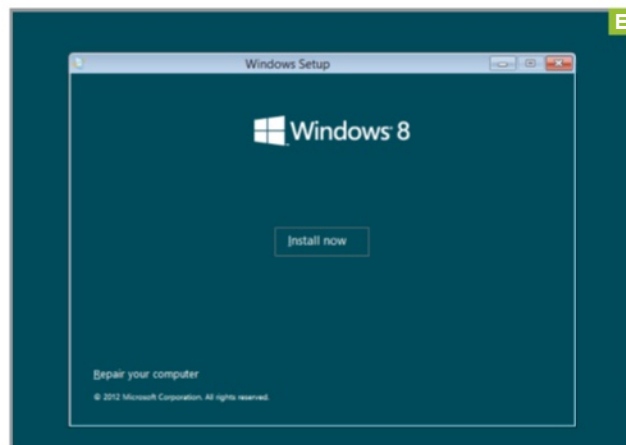
» Now, it's time to copy your Windows 8 installation

files from their drive—virtual or real—to your USB key. Close diskpart by typing `exit` and hitting Enter. From the command prompt, type `xcopy x:\*.* y:\ /e /f /h`. In our example, however, the “x:\” designation should actually represent the drive letter of your mounted Windows 8 installation .iso file or physical DVD. The “y:\” should be the actual drive letter of your USB key. Once you’ve made those alterations, hit Enter and let ‘er rip—all of the Windows 8 files will start transferring over to your USB key (image D).



» And now’s as good a time as any to talk about upgrading versus starting from scratch, since you’re likely to be presented with both of these options at the very beginning of the Windows 8 installation process.

» Upgrading can be convenient, but a clean install of an operating system is generally the best way to go. Right now, your computer is likely full of crap—applications you once installed and left behind, an old driver version or two that you’ve forgotten about, and just general OS bloat that can hit a variety of points around your operating system (from your Start menu to your registry). Consider the installation of a new operating system to be kind of like the equivalent of spring cleaning in the real world. It gives you, and your poor PC, a chance to start anew.



3 INSTALL WINDOWS 8—UPGRADE OR CLEAN?

Once you’re ready to install Windows 8 from your USB key, you’ll want to restart your computer and either boot into your motherboard’s BIOS or hit the associated hotkey that allows you to access the boot menu during POST. Regardless of which way you go about it, you’ll want to make sure your system is set to first boot off of your USB key instead of your existing hard drive.

» Be on the lookout to see if your motherboard requires you to hit a key—any key on your keyboard—to confirm that you want to boot to your USB drive. From there, the actual Windows 8 installation process should look a lot like what you’re already used to, if you’ve ever installed Windows 7 or Windows Vista (image E).

Monitor Your Home Network with NetWorx

YOU'LL NEED THIS

NETWORK

A free network monitoring program available at www.softperfect.com/products/networx.

THESE DAYS, MOST of us pay for high-speed Internet connections. If you do, you know that it can be a major monthly expenditure.

NetWorx helps you get the most out of your investment. It lets you keep tabs on the performance of your network and tells you just where any problems might lie. Has an Ethernet cable become trapped in a door, kinked, and broken? Is a Wi-Fi signal being hampered by walls in the way? If you aren't getting the sorts of speeds you expect from your equipment, NetWorx is a great way to find out why.

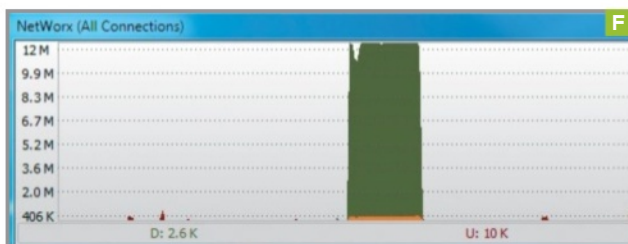
NetWorx can monitor your whole network and your router too, so if all of your gear is functioning correctly, you can pin the poor-performance blame squarely on your broadband provider. There's no sense paying for bad service. —ALEX COX

1 DOWNLOAD AND INSTALL NETWORX Get NetWorx from www.softperfect.com/products/networx. Run the installer and click Next on each page. We recommend you install the Desk Band component if you want to be able to see your network traffic at a glance. Click Finish at the end of the installation procedure and NetWorx will launch its initial configuration wizard.

» You shouldn't need to change much in the configuration wizard. During Step 2, you may want to define which connection you're watching if you use both wired and wireless networks, but "All connections" is fine for most purposes. Once you've clicked Finish, an icon will appear in your taskbar. If it disappears, as it did on ours, expand the taskbar and drag the icon onto the main area.

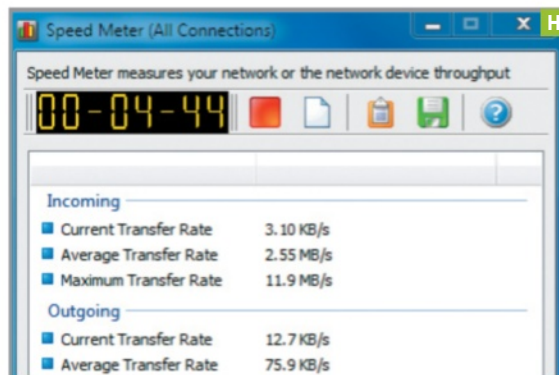
2 VIEW YOUR NETWORK TRAFFIC If you chose to install the Desk Band, you should be aware that it's hidden by default, which is rather silly because it's a tool that's only useful if it's visible all the time. Right-click your taskbar, go to Toolbars and click NetWorx Desk Bar to bring it to the front. You can drag the slider on the left to extend or shrink the graph, which updates whenever there's any network traffic, or right-click it to access the NetWorx menu.

» If you don't want to use the Desk Band, you can see an always-on-top graph of your network traffic by right-clicking the taskbar icon and selecting Show Graph ([image F](#)). You can drag its corners to make it bigger if you need to. Green spikes represent download traffic, red spikes represent upload traffic, and yellow spikes correspond to times when traffic was moving in both directions.



3 MANAGE YOUR USE Right-click the taskbar icon and select Quota. You can use this interface to define the maximum amount of network traffic you want to use over a specific period, which is useful if you have a capped Internet connection ([image G](#)). NetWorx won't cut off your network, but it will warn you when you're approaching your limit. Click Setup, choose your options, and input your intended limit in KB.

» The Speed Meter section gives you details of your network speed, or the lack thereof ([image H](#)). We'd suggest running the monitor at the start of a typical day and checking its results at the end, or running it before a heavy download or upload to get a good handle on the speed levels you're achieving. Click the disc icon to save your results, so you can compare multiple days later on.

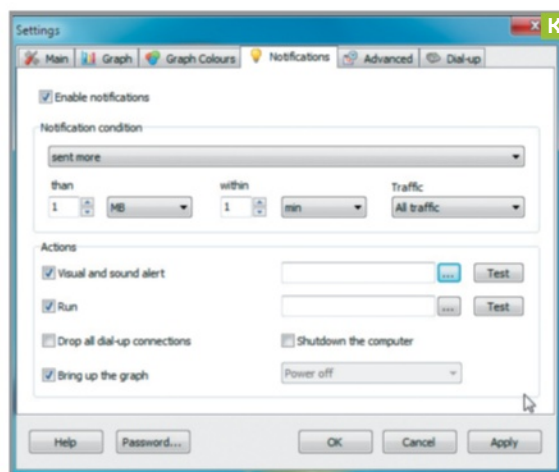
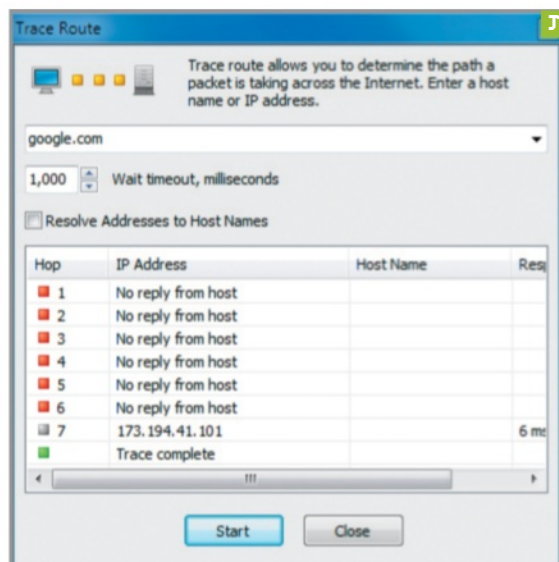
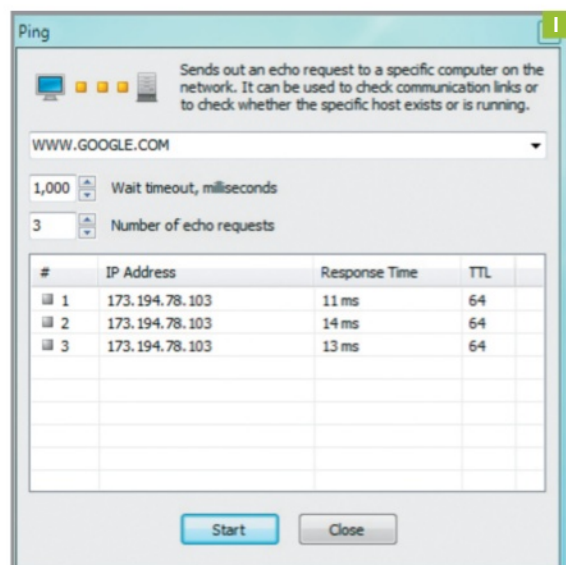


4 TROUBLESHOOT YOUR CONNECTION Say you've got a network issue. Although you can't use NetWorx to solve it, you can use its tools to find out exactly where the problem lies. Start with the Ping window, which sends a quick, sonar-like "ping" to any IP address you choose (**image I**). If the message is returned, the connection is working. If it's not, or if it takes a long time to bounce back, there's a problem between the computers.

» A trace route is much like a ping, except it bounces from your machine to a particular computer on the web, giving you data about the route it's taken and the number of "hops" along the way (**image J**). Enter a web address on the Trace Route screen and it will attempt to get a reply from that site. If it doesn't, look at the route taken and you should be able to tell where the problem is.

» If you have a wired and a wireless network connection, you can restrict NetWorx to one or the other in the Settings page. In the Main tab, click the drop-down box under "Monitored interfaces" and select the appropriate option. You can also monitor your router rather than a single computer—useful in a family home. Click the link below and enter the IP address of your router.

» Two other areas to note on the Settings window are the Notifications tab (**image K**), in which you can ask NetWorx to tell you if certain conditions are met, and the Synchronization section of the Advanced tab, which collects data from all local machines on which NetWorx is installed. Once that's done, you're watching your whole network for the slightest hiccup. ⏻



Start a Minecraft Server

YOU'LL NEED THIS A MINECRAFT ACCOUNT

This isn't going to work if you haven't purchased Minecraft. Get it at www.mojang.com.

A SPARE PC

It's best to run the server on a machine you're not going to want to run the client on at the same time.

MINECRAFT IS TWO games in one. There's the solitary survival game, where you plunge into a digital wilderness like a cuboid Bear Grylls and punch trees, and there's the multiplayer game, where you compete to build the largest pixel-penis and nudge your chums into lava for a giggle. If you've only played the former, you owe it to yourself to experience the latter. It's Minecraft on a completely different level.

Imagine collaborating on builds with someone else on a Creative server; it'll take half the time to create Mount Phallus than it might have done alone, or even less if you get more hands involved. A multiplayer survival server can be great fun—the quest to defeat the Ender Dragon is much less of a slog if you're all turning up pearls—and one with PVP enabled is even better. Here's how to get started. —ALAN SMITHEE

SET UP THE SERVER Before we wade in, we'll presume you've run Minecraft before. This means you'll have the latest version of Java installed—preferably the 64-bit version, if you're running a 64-bit system. This should be Java version 1.7 or higher. You can find out which version you're running by opening a command prompt window (Windows key + R), typing **cmd**, hitting Enter, and typing **java -version**. If an error is thrown up, or an older version number is displayed, head over to Oracle's Java download page (www.java.com/en/download) and snag the latest update. Bear in mind while you're installing it that it will suggest you might want to install the Ask toolbar. You don't want to do that, really. Uncheck the appropriate box.

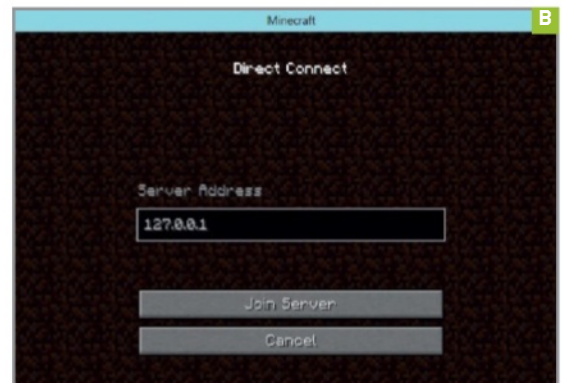
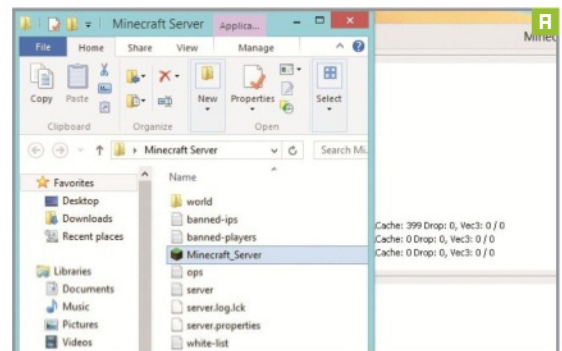
» If you are still having trouble identifying your Java version, you may need to set a system path to the Java installation folder. Right-click Computer, choose Properties > Advanced tab, and then click Environment Variables, and append C:\Program Files\Java\jre7\bin to the end of the Path list to ensure that you can access Java from anywhere on your PC.

» Minecraft's server software runs in Java, just the same as its client. It had better, given the amount of time we just spent making sure Java was running properly. Unlike the client, though, there's no pretty cuboid interface to play with. You'll have to make changes in a text file, and if you want to play on a locally hosted server, you'll need to run the client separately. As you'll see, though, hosting your own Minecraft server isn't nearly as tricky as it might seem at first.

» It's actually really easy to start a Minecraft server on your local network. You'll want to start by grabbing the server-specific packages from publisher Mojang. Just head to www.minecraft.net/download and get the simple Minecraft_Server.exe file. Once it's downloaded, give it its own folder somewhere you can find it.

» Right-click the executable and run it as Administrator. You'll soon see the reason we give it its own folder: Running it the first time generates a whole heap of additional configuration files and level data (**image A**), which we'll want to keep neat and tucked out of the way. It'll create a new world with a random seed, and just like that, you've got a server going.

» To prove to yourself that it's working, fire up the Minecraft client. You'll have to have actually bought the game to do this. Choose the Multiplayer option, Direct Connect, and use the address 127.0.0.1 (**image B**), which is the universal IP for "this machine." Local machines on your network should be able to connect using your computer's IP.



2 OPEN UP TO THE WEB Running a server on your local network is one thing; opening that server up to the Internet is quite another. For starters, the terms of your broadband contract may preclude you from running any kind of gaming server from your home.

» We can't really help you there—apart from suggesting a third-party server solution—but if you're OK to do it, you'll need to configure your router to forward your ports appropriately. Find out the local IP address of the machine on which you're running the Minecraft server (and make it

static, if you can), and make sure all connections to your router on port 25565 go straight to your server machine. Use www.portforward.com to find the specific instructions for your particular router.

» We'd recommend, before you allow anyone to connect to your router directly, obfuscating your external IP address. Portforward.com shows your external IP on its front page; copy this down, and head to www.no-ip.org to sign up for a free IP-forwarding address. Send this to your online friends, and they'll be able to connect to your PC with no knowledge of your IP.

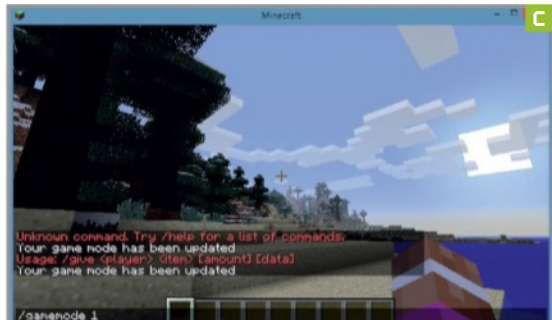
3 MASTER YOUR DOMAIN Being the owner of a Minecraft server means one thing first and foremost: giving yourself godly abilities beyond the reach of mere mortals. Shut down your server, then open the file in its directory called ops.txt. Stick your username in here, save it, then run the server again. Test it out by changing your gamemode—hit / and type **gamemode 1** (image C), and you should enter creative mode.

» One of the most useful commands as an op is give; you can use it for a sneaky cheat or to give items that can't be legitimately obtained by other means. There's a list of item values on the Minecraft wiki (<http://bit.ly/ZpWEaV>). Try it: Give yourself one monster spawner with **/give <nickname> 52 1**, or a stack of diamonds (always pretty useful) with **/give <nickname> 264 64**.

» Wouldn't it be great to have control over the sun and the moon? Perhaps the winter wouldn't be quite so harsh if we could just type **/time set day** to make it immediately sunrise, **/time set night** to make it sunset, or use any value between 0 and 25,000 to set the time more specifically (image D). It affects everyone connected to your server, so use it lightly—people will know you're messing around with the server!

» Chances are you're running a private server for your friends rather than a public one. Use **/whitelist on** to set up whitelisting, where only people with approved usernames (and those in the ops file) are allowed to connect (image E). Then type **/whitelist add <nickname>** to insert a friend's name on the list, **/whitelist remove <nickname>** to get rid of them, and **/whitelist list** to, yes, list who's on the list.

» If you're on the blacklist, you're not coming in. Use **/ban <nickname> [reason]** to add them (image F), or **/banip <ip address>** to ban a particular machine. If you're messing with a pal, **/kick <nickname> [reason]** boots them off of the server temporarily. To take someone off the blacklist use **/pardon <nickname>**.



Make Video Conference Calls for Free with ooVoo

YOU'LL NEED THIS

OOVVOO

Get it at www.ooVoo.com, or your app store of choice. You'll also need to sign up for an account.

A GOOGLE ACCOUNT

If you want to upload group chats to YouTube, you have to have a Google account.

SKYPE, LIKE Hoover and Google, is one of those company names that has become a verb. People say, "I'll Skype you in half an hour!" and you know exactly what they mean. On the off chance that you're not familiar with Skype, it's a VoIP service from Microsoft—that is, a telephone service that lets you make voice and video calls over your Internet connection. It's loved by millions because it lets you make calls or have video chats between PCs for free, no matter where you are in the world. If you want to make a call from your PC to a telephone, you can do so by paying a few cents per call for what's known as the "last mile."

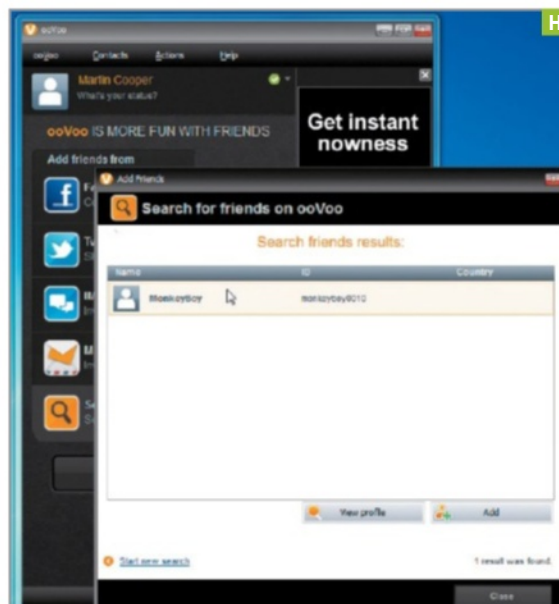
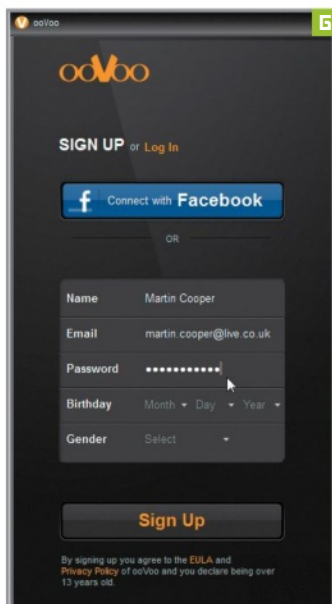
If you want even more from your VoIP telephone system, you should take a look at a service called ooVoo. It lets you make VoIP telephone and video calls to PCs, Android devices, Macs, and Apple tablets, too. What's more, it will let 12 people share a group video call for free from any PC, tablet, or smartphone. Skype and ooVoo aren't compatible, so you'll need to get your friends to sign up. We'll show you how to set up and use ooVoo. —**MARTIN COOPER**

1 GET SET UP Go to www.ooVoo.com, and click Get ooVoo to download the installer. There's nothing too complicated during the install process—just the normal language options and such—but it does try to slip an Ask toolbar install by you, so make sure to keep an eye open and uncheck those boxes. When the process has completed, click Finish.

» Next up, you'll need to create an ooVoo account. If you're a Facebook member you can use the details it holds to access ooVoo. Just click Connect with Facebook and enter your usual security details. Alternatively, fill in the form in the center of the screen and click Sign Up (Image G). As always, it's a good idea to choose a password that contains a mix of letters and numbers.

» When it comes to VoIP, there's a good chance your friends use Skype, though some may prefer to use Apple's FaceTime. Sadly, ooVoo isn't quite so well known. You'll need to contact your friends, tell them you're a member, and suggest they also sign up. There are Facebook and Twitter options in the program to broadcast news of your membership, if you're the social networking sort, or the option to send someone an email that will make it easy to sign up for ooVoo.

» Once your friends have joined ooVoo, you'll need to add them to your address book by searching for their user name and clicking the Add button (Image H). You'll need to repeat this process for all your friends, and of course on their end, your friends will need to accept your request by clicking Add when prompted. As we've said previously, the good thing about ooVoo is that it works on all versions of Windows, Apple devices, and Android. So no matter which device your pals use, there's every chance you'll be able to video conference with them, unlike with competing services like Google Hangouts.

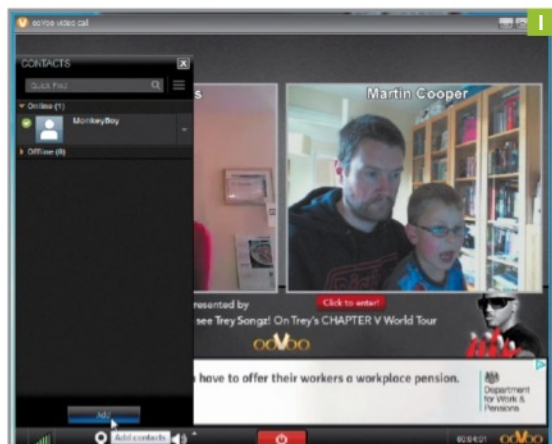


2 MAKE A CALL To begin a call, click Actions at the top of the screen and then click Start a Web Call. Your webcam should now spring to life and you should see yourself in the center of the screen. Now click Add to Call and then Contacts. These are the ooVoo contacts you've just made. Select your friend and click Add (Image I). When they answer, you'll be able to chat.

» Adding more of your ooVoo friends into your conversation couldn't be easier. All you need do is move your mouse into the ooVoo windows and then when the menu options appear at the top of the screen, select Add to Call. Now, once again click Contacts, find your other friends, and invite them to join in (Image J).

» We found that as you add more and more people to the

call, picture quality can start to degrade. The best way to ensure that everything keeps working smoothly is to ask your friends to stay in one spot, if possible. ooVoo's compression algorithm pushes more data across as more stuff in the video call changes, so someone using a smartphone outside and moving around will use up a lot more bandwidth than someone sitting in one place in front of their computer. You'll also need to be disciplined about taking turns speaking—12 people trying to talk over each other on a video call gets overwhelming quickly. When you're done, just click the red button to end the call.

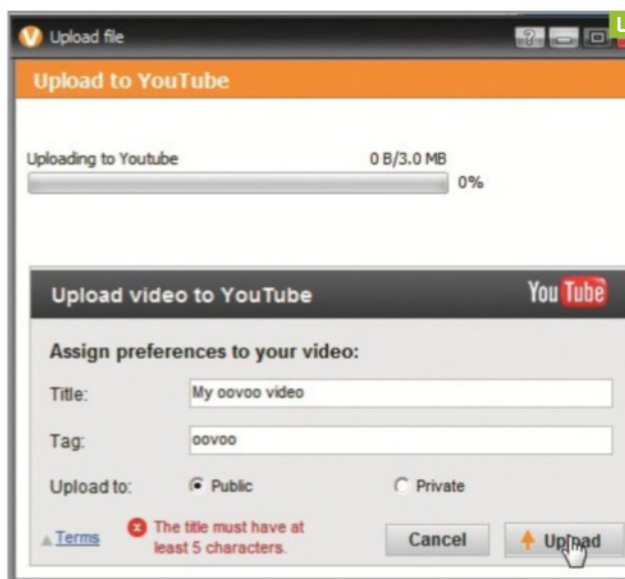
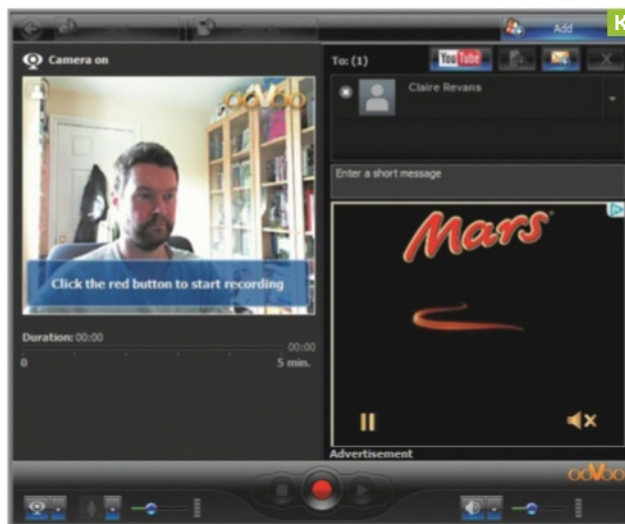


3 OTHER OOVOO FEATURES If your friend is offline, you can leave a video voicemail message. When they log on, they'll be notified and can watch your small film. With ooVoo running, click the small icon that shows a film emerging from an envelope. Now, click the red record button (image K). When you're done, click the blue stop button. Now, at the top-left of the Window, click Send. It's as easy as that.

» One of ooVoo's coolest features is the ability to record a conversation and upload it to YouTube. This is a great way to document and preserve group chats, and can even be a good way to record an impromptu group presentation or podcast. When you're all logged on, ready, and chatting, move your mouse onto ooVoo, click Actions, and then

Record. When you're done, click Stop.

» To share your conversations via YouTube, you'll need an account. If you have an account with Gmail or any other Google service, that same account will work for YouTube. Assuming you have one, click ooVoo > History > Recorded files. Now, select your conversation file and then YouTube Upload. There will be a brief pause while your video is processed (image L). Enter your YouTube username and password. You'll be prompted to title and tag your video, then click Upload.



Edit Video in Blender

YOU'LL NEED THIS

PLENTY OF STORAGE

Like with any high-quality video-editing software, Blender needs a lot of drive space to work with.

BLENDER

The open source 3D Modeling suite is available at www.blender.org.

BLENDER, available for free at www.blender.org, is the best-known open-source 3D-rendering software around. However, it's not only useful for 3D modelers—it actually has a built-in nonlinear video editor, as well.

If you're willing to stumble around a complex interface, the flexibility of Blender's editing capabilities is its clear advantage over other free options like Windows Movie Maker. —NEIL MOHR

DECIPHER THE BLENDER INTERFACE The biggest stumbling block for general Blender use is coming to grips with its crazy, nonstandard interface. It's set up for super-slick 3D manipulation using a mouse in a very unusual way.

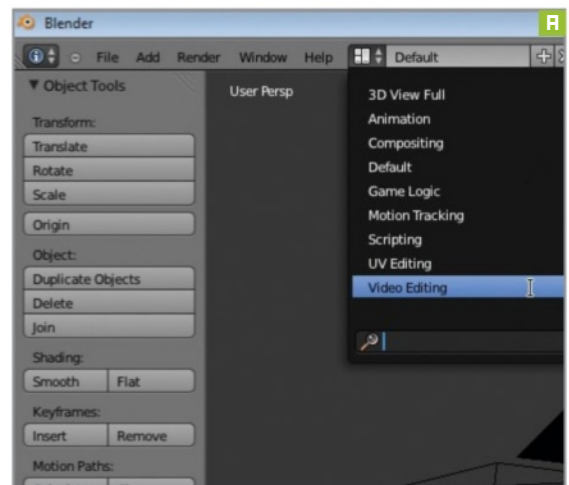
» The key thing to get your head around is that tracks are selected with the right mouse button. Doubly odd is that, if you're moving tracks, to then drop them you use the left mouse button, not the right. It's possible to zoom in and out of most panels using the mouse wheel and to scroll using the super-slim scroll bars at the edges of certain panels.

» Aside from the interface, it also turns out to be important that you set the base Properties to the correct frame rate to match your video. If you don't, the audio and video won't sync correctly. The smart thing about Blender is that it supports the audio, video, and image formats you need it to. For video that's primarily AVI, MP4, and MOV; for images it's JPEG, PNG, and GIF. Audio as part of videos can be a wide range of standard formats such as MP3, AAC, FLAC; for audio-only files, Blender oddly only supports 16-bit WAV. Getting standard video into Blender is just a simple drag-and-drop away. Using the master timeline at the very bottom, you're able to play and pause the footage. The scratchpad here makes it easy to jump to or run through a small section of footage.

» To get started on your first video, enable Blender's pre-defined video-editing mode. To do this, locate the upper-most menu bar, then click the menu to the right of the Help menu and select Video Editing (**image A**).

Going clockwise from the top-left, the first thing you'll see is the Graph Editor, which we'll use for audio fades. Next is the main Video Sequence Editor, and below is the strip timeline where the various audio and videos segments are shown. At the bottom is the master timeline. Note that Blender places each panel's menu at the bottom, and you can maximize/minimize any by pressing Shift + Spacebar.

» If the menu strips are too long, you can scroll them with the middle mouse button. As you add video clips these are selected with the right mouse button, using Shift + right mouse to multiselect them. The scale-like strips running along panels double as scroll bars; enlarge these vertically by dragging the tiny dot at the end of the bars.



2 START EDITING VIDEO Before importing video, set Blender to the correct resolution and frame rate, or else it will drop frames from your imported clips. Click the bottom-left icon of the Graph Editor and select Properties (**image B**). Under Dimensions ensure Frame Rate matches your video, probably 29.97fps, and check the Resolution—this will likely be either 1280x720 or 1920x1080. Then drag it onto the timeline.

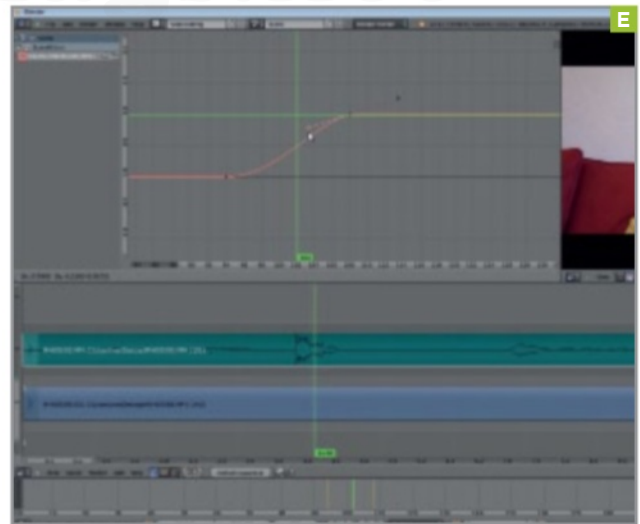
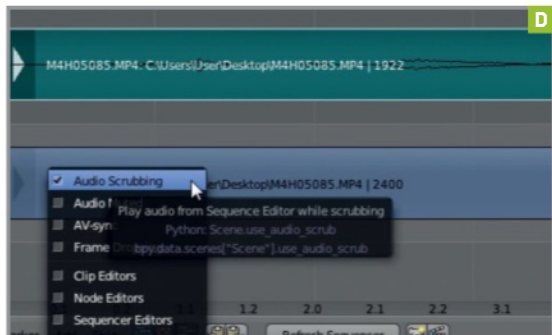
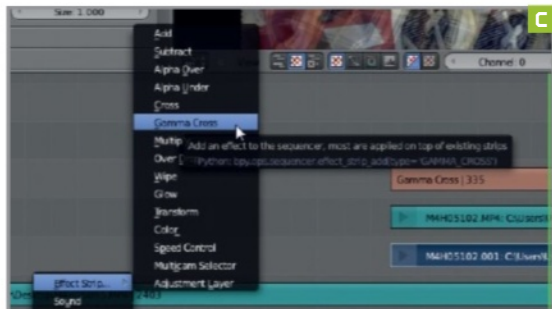
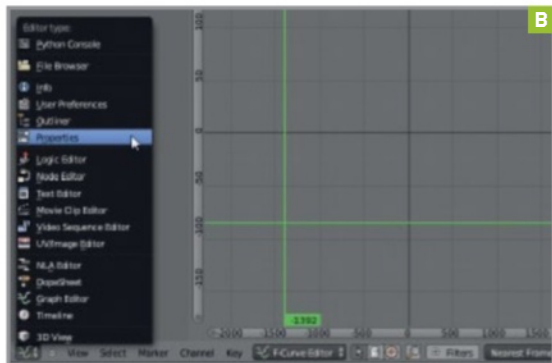
» At the very bottom, open the Sync Mode and choose AV-Sync. Play the video with the controls to the left. Left-click and drag the master timeline (scratchpad) at the bottom to scan your video. The green strips are audio, blue are video, yellow are effects. Hover the mouse over the left edge of the video preview panel and you're able to drag and resize it—use the mouse wheel to enlarge the preview.

» Open the Add menu at the base of the main timeline. You can easily delete strips by pressing the Delete key. Each strip has a start and end handle, which you can grab and drag to clip the strip. You can also duplicate strips with Shift + D. Press B to enable a drag-and-drop multiselect box. To split video, press K—this uses the clip system. Press Shift + K to hard split the clip.

» To add a second overlapping bit of footage, you will need to press Shift and right-click the first and then second video strip, select the timeline and click Add → Effect → Gamma Cross (**image C**). This will add a basic fade transition between the two clips. Press N to see the Properties. Fading the wrong way around? Select the effect strip, open the timeline Strip menu, and select Swap Inputs.

» Default scrubbing ignores audio—you can turn this on using the master timeline. You can do this by selecting Playback → Audio Scrubbing (**image D**), so audio is also previewed. Select an audio strip, press N to open the Properties, scroll down to find Sound, and check Draw Waveform to add a waveform to the timeline.

» Audio fades are generated via the Keyframe system. Select the audio strip required and cue up the start point, set the volume level via Properties, and with Volume selected, press I. Now, cue up the end point for the fade and follow the same process. Markers for the start and end will appear in the master timeline and the Graph Editor (**image E**).

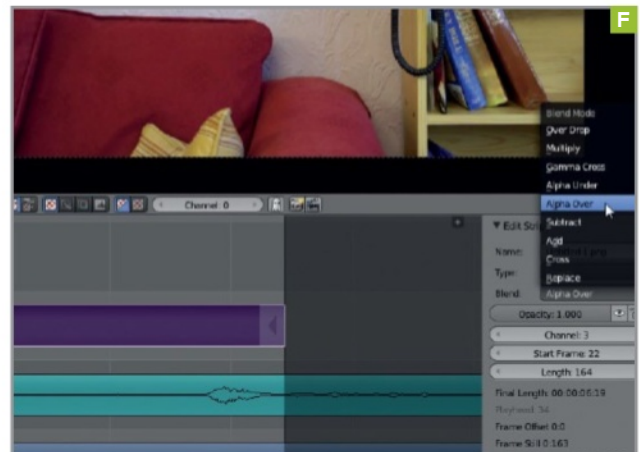


3 ADD TITLES AND RENDER Titling in Blender has to be done via your own created images. In GIMP or Photoshop, create a correctly sized image with a transparent background. Drop this into Blender, press N to view the Properties, and select Blend → Alpha Over (**image F**) to create the transparency. Farther down the properties, adjust Multiply for a see-through effect—you're able to adjust color and intensity here, too.

» Using the keyframe system, create a scroll effect for the title. Select the image strip and move to the start, locate and select Image Offset in the image Properties, left-click Y, and drag right to move it offscreen, then press I to create the keyframe. Drag the scratchpad toward the end of the image strip, move the logo down, and press I to scroll the text down on screen.

» To output, change the top-left Graph Editor section back to Properties by selecting its icon in the bottom-left of the panel. Scroll down to Output, change PNG to a suitable video format, ideally H.264, select RGB output, format to H.264, and audio to MP3. You'll find that Blender isn't the fastest rendering option around. Even a short clip is going to take a while to complete.

» Under Output is the output file directory folder, so point this to your preferred location. Before you render, scroll to the top, ensure End Frame is set to the correct end frame of the video, drag the scratchpad to the last frame and this figure will be displayed at the bottom, next to the video controls. Finally, click Animation to render your video sequence.



YOU'LL NEED THIS

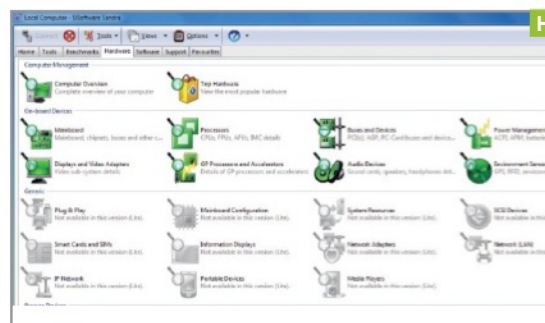
Download the Lite version for free at www.sisoftware.net.

The key to benchmarking is the software that you're actually using to test your system. There are plenty of neat little tools and utilities that you can use to make sure that the individual components of your rig are up to speed, but for quick-yet-comprehensive benchmarking, an all-in-one tool is most convenient.

Thankfully, there is a suite of utilities that has been a mainstay of the benchmarking world for several years, and that suite is SiSoftware Sandra. It offers the ability to check the performance of your machine for free, if you're just planning to use it for your own personal information (which we'll assume you are). Let's get started. —ALAN DEXTER

» Now, you need to pick a trusted hosting site to download Sandra from. These are all respected sites, so select any of them and your download will begin. Once the program has downloaded, launch it and select the default installation options. Finally, click “Launch Sandra at the end of the process.”

» Scroll down farther for information about the memory installed in your system. Here, for instance, we find that we have three DIMM slots occupied—banks 0, 3, and 6—and each one has a 2GB stick of DDR3 running at 532MHz. Scrolling down more reveals that the memory is made by Patriot Memory and is rated at 533MHz at 7-7-7-20 timings.



Parameter	Value
Mainboard	
Manufacturer	Intel
Multi-Processor (MP) Support	No
Multi-Processing (MP) Version	1.40
Model	D18B50
Version	AAC29231-593
Serial Number	US0092*****
Asset Tag	Base Board Asset Tag
Location in Chassis	Base Board Chassis Location
Mainboard Properties	
Removable	No
Replaceable	Yes
Hot Swap	No
On-board Devices	
Intel(R) i210GM Gigabit Ethernet Device	Ethernet Adapter (Enabled)
Intel(R) High Definition Audio Device	Sound Adapter (Enabled)
Chipset	
Model	Intel XSB I/O Hub
OEM Device Name	Intel XSB I/O Hub
Revision	03
Bus	Intel QSB (Quick Path)
Front Side Bus Speed	2x 2.40GHz (4.80GHz)
Maximum FSB Speed	2x 3.20GHz (6.40GHz)
Width	20-bit / 20-bit
HTT - Hyper-Threading Technology	Yes

» Your motherboard is a key component, as it's responsible for

3 START BENCHMARKING How does this memory performance stack up against every other system out there? This is where Sandra's benchmarking tools step in. Close your motherboard report and click Benchmarks. Scroll down until you get to the Memory Controller subsection and then double-click the Memory Bandwidth icon (**image J**) to launch that module.

» To run the benchmark, you simply need to click Refresh—the icon made up of two blue arrows to the left of the checkmark. Once clicked, this will set Sandra testing the living daylights out of your memory. It can take a few minutes and you can't do anything else with your machine while it's running, so just let it do its thing. Of course, make sure that you're not running any other programs in the background while running this or any other benchmark.

» Once this is done, you'll be presented with a dynamic graph showing you how your memory compares to other setups (**image K**). The tabs along the top present different rankings and information—such as how your memory compares to the best value options around, as well as how you rank compared to everyone else who has run Sandra.

» Click Rank, then click the button labeled View @ SiSoftware Ranker. This will take you to a site that shows more information that can help you spot if you have a problem (**image L**). In the top section of this page, you'll find your actual memory throughput (the score), along with a "qualification" telling you whether this is a good result.

» In the Statistical Analysis section, you'll find the range that's expected from your hardware, which is a quick way to see if something isn't quite right. If your score is outside the range given, then your memory has either been configured incorrectly, or there's a hardware fault with your memory sticks or your motherboard.

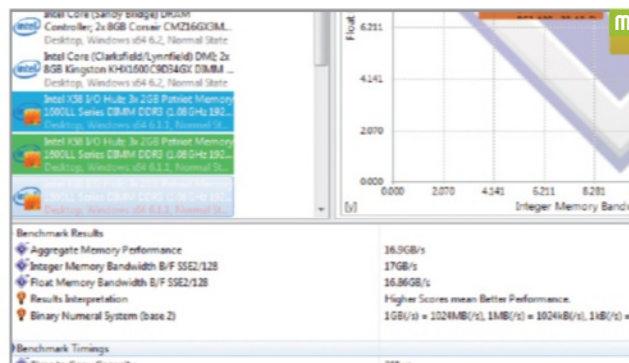


4 ADDRESS ANY PROBLEMS Go back to Sandra and look in the bottom box. This shows you detailed results from the benchmark you've just run, along with any specific information about how the benchmark was run—how much memory was used, for instance (**image M**). Scroll to the bottom and you'll find tips for your PC, such as whether there's a BIOS update for your PC.

» We've discovered that there's a BIOS update for our machine and that we can potentially run the RAM at faster settings than we currently do. A quick check of our motherboard manufacturer's website confirms that there is indeed a BIOS update, and after a quick download, we're rocking the latest BIOS.

» To change the memory speed, we pop into the BIOS and boost it using the Extreme Performance Profile (or XMP). How much you get out of your memory depends very much on your motherboard, but have a good look in the Performance section. The next step is to reboot and make sure we're getting the most from the memory.

» You've now seen how you can use SiSoftware Sandra to make sure you're getting the optimal performance from your memory, and you can repeat the process for other components such as the processor and graphics card. Follow the same steps, make sense of the benchmark results, and find out what the appropriate range is for your hardware. ☺



Troubleshoot PC Problems with Event Viewer

YOU'LL NEED THIS WINDOWS

The modern version of the Event Viewer was introduced in Windows Vista, so any recent Windows install will work.

NOBODY LIKES an ailing PC, and while Windows has become more reliable with each new release, there are still times when even tools like Action Center and the built-in Troubleshooter can't diagnose a problem and come up with a solution.

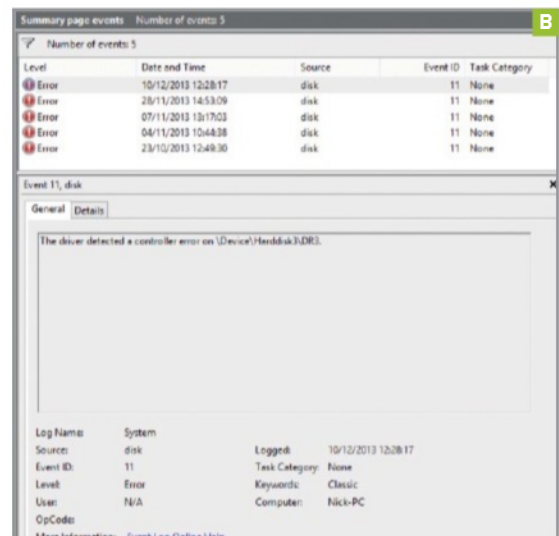
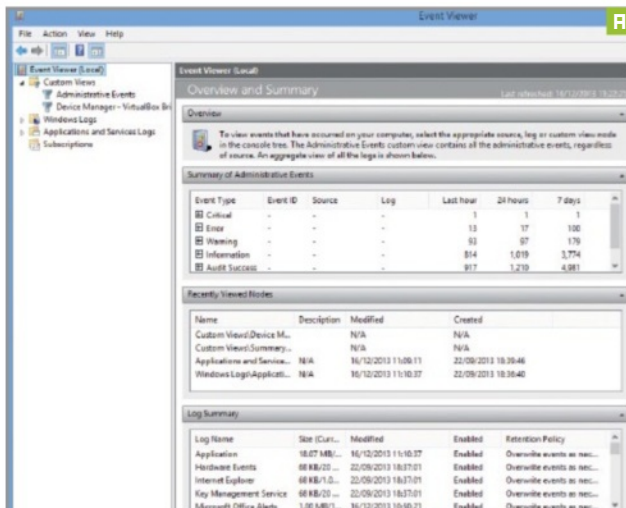
Thankfully, there's a less well known program that can step into the breach: Windows Event Viewer. Windows records a series of logs chronicling everything that's going on under the hood of your PC, including any problems—both visible and hidden away. By carefully examining these logs, you can find out what's causing all kinds of glitches, from obvious—if cryptic—error messages to more vague issues, such as sluggish behavior or periodic freezes. In this tutorial we'll show you how to collect this information, then use it to track down possible solutions to your woes. —**NICK PEERS**

LAUNCH THE EVENT VIEWER Windows 8 users can launch Event Viewer via the Quick Access Menu, which you can access quickly by pressing Windows + X on your keyboard. Windows 7 and Vista users should press Windows + R to open the Run dialog box, then type **eventvwr**, and press Enter. If you see a prompt from User Account Control, click Yes or Continue.

» The main Event Viewer screen will now appear (**Image A**). After a short pause while the tool analyzes your system, the middle pane here will display three categories of information. You should concentrate on the Summary of Administrative Events at the top, which displays a list of each type of event logged. Pay particular attention to Critical, Error, and Warning events.

» Note how each event type is logged according to the last time it occurred. If the problem you're investigating happened recently, this will help you focus your search on a specific section. Click the section header to expand it and use the annotation to help identify possible events that could potentially be related to the problem you're experiencing.

» Double-click an event from this list to view all instances of it (**Image B**), including the time and date when each instance occurred. This can help link the event to a particular problem. Make a note of the description—the Details tab provides more technical data if you (or someone who's helping troubleshoot your system) need it later.



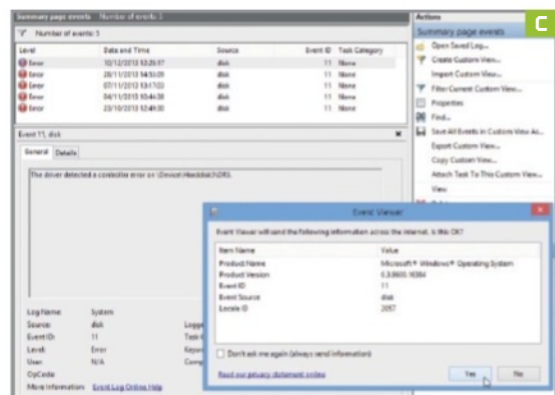
2 SEARCH FOR SOLUTIONS To learn more about the event in question—and possibly track down a solution, if what needs to be done isn't obvious—click the "Event Log Online Help" link at the bottom of the page. Review the information being sent (**Image C**) and click Yes to see if there's more information at TechNet (Microsoft's assistance and resource site for IT professionals).

» Most of the time, TechNet will claim that the page is not found, but don't become disheartened—try typing the Event ID number plus the word **EventID** into the Search box and you'll find links to further information that might help resolve the problem you're investigating, including troubleshooting guides for specific error messages.

» TechNet may return no results for your Event ID, but don't give up yet. Make a note of the Event ID, Source, and description under the General tab, then try typing these into Google and see what results come up. You may come across helpful troubleshooting information via a technical support web page or discussion forum.

» If too few results are returned, try searching for fewer

words or omitting either the Source or Event ID from your terms. If your search gives you too many results, try narrowing them down by including more information about your specific problem—version of Windows, hardware device, or software program, for example—then search again and see what comes back.



3 FILTER RESULTS AND SET ALERTS If you're finding it difficult to isolate a specific event that correlates with your problem, you can browse the available logs manually to help narrow your search. Expand "Windows Logs" in the left-hand pane (**Image D**), where you'll find logs organized into categories. Use Applications to search for program-related problems, and System for Windows and hardware.

» Event Viewer records all manner of information, much of which will be irrelevant. Click the "Filter current log" button in the right-hand pane to sort the list in a number of different ways: by the time the event occurred, the type of event (focus on Critical, Error, and Warning), event sources, IDs, keywords, or any combination of these (**Image E**). Click OK when you're done.

» If you want to create a filter across multiple logs, or make a filter that you can access easily in future, click "Create custom view." It's a handy function that works in the same way as the standard filter. To monitor more than one log with your custom view, click the "Event logs" drop-down menu and then tick the logs you wish to include.

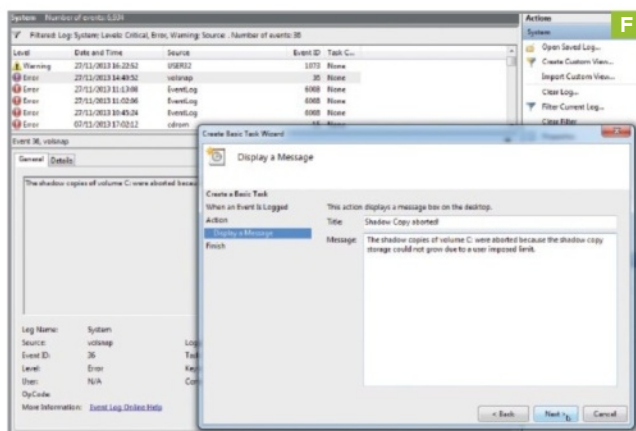
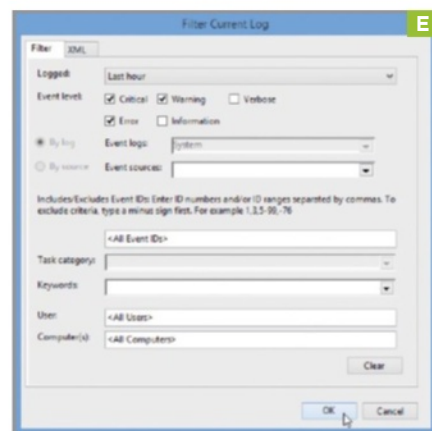
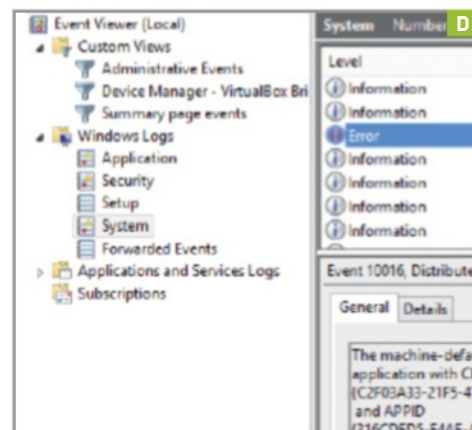
» Click the OK button, then give your custom view a suitably descriptive name, and choose where you want to save it within the Custom Views tree in the left-hand pane. You'll now be able to access this view at any time directly from here—perfect if you're going to be engaging in targeted troubleshooting over an extended period of time.

» The Event Viewer also lets you create handy alerts in Windows 7 or Vista that are triggered when specific events occur. This can be a useful tool for troubleshooting if you're trying to find an underlying problem. Once you've located the event that you wish to monitor, start by right-clicking it and choosing the option "Attach task to this event."

» Change the name of the alert to something more descriptive and useful, then click the Next button twice (**Image F**). Tell Event Viewer whether you want to be alerted by email or a pop-up dialog box and click Next. Fill in the details—where to send the email, along with the alert message—and click Next, followed by Finish, and OK.

» Eventually, once you've resolved your Windows issues, you may no longer want that alert popping up. To remove it, open Task Scheduler by clicking Start → All Programs → Accessories → System Tools. Expand Task Scheduler Library → Event Viewer Tasks, right-click on the unwanted alert, and choose Delete, followed by Yes when prompted.

» Now that you've discovered the basics of how Windows Event Viewer works, you can use it to help you track down problems with your computer, giving you the information you need to not just diagnose what's ailing your PC, but also hopefully find a solution to bring it back to good working order. Best of luck with your troubleshooting!



Share a Mouse and Keyboard with Synergy

YOU'LL NEED THIS MONITORS

Each computer requires its own independent display.

SYNERGY

Get the software from www.synergy-foss.org/download.

You can download it free, or make a small donation to support the developer.

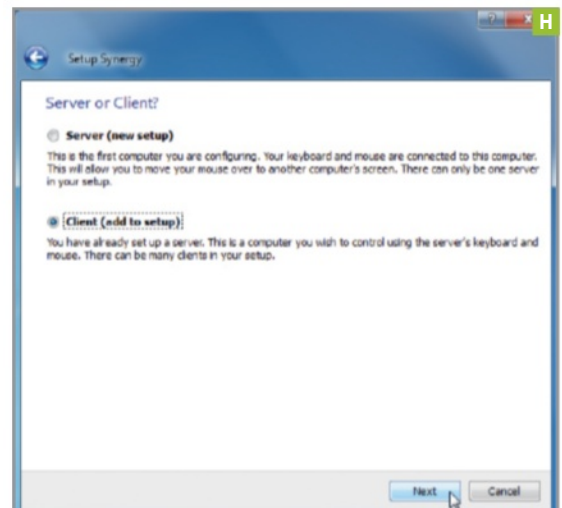
TOO MANY KEYBOARDS and mice cluttering your desk? Fed up with your laptop's touchpad and keyboard, but tired of having to unplug your desktop's peripherals to use instead? Often working on two or more PCs or Macs and find it awkward switching from one mouse to another? If so, you need a program called Synergy, which is free to download and use.

Synergy is a clever tool that can free up space on your increasingly cluttered desk by allowing you to use one mouse and keyboard on several computers at once. Synergy also allows you to share the clipboard across your connected PCs, and if you donate and become a premium user, you can easily transfer files between desktops by dragging-and-dropping from one display to another, saving you time as well as valuable real estate. Best of all, Synergy doesn't require any special hardware or even a direct connection from one computer to the other—all it requires is that the computers be on the same wired or wireless network. Find out how to set it up and use it with our step-by-step guide. —NICK PEERS

1 INSTALL SYNERGY Install the latest version of Synergy on your server PC—the one with the keyboard and mouse you plan to use. You can download the free version from www.synergy-foss.org, or choose the Premium edition and make a donation to the project. Choose 32-bit or 64-bit, depending on your version of Windows. You'll find versions of Synergy for Mac and Linux here, too. Install the program and click Close.

» Set your language and click Next. You'll now be asked again whether you want to become a premium user to access the latest features. Make your choice and click Next. As this is the first computer you're setting up, choose "Server (new setup)" and click Next to continue. For greater security, tick "Enable encryption" and enter a strong password before clicking Finish (**Image G**). Particularly if you're on an open network, not using encryption could leave your keystrokes visible to prying eyes.

» Switch to another computer or laptop and install Synergy on it following the same process as before. When running the setup wizard after installation, log in with your premium account details (if you chose to make a donation for one), then choose "Client (add to setup)" (**Image H**). Tick "Enable encryption," then type the same password you used in the previous step before clicking Finish.

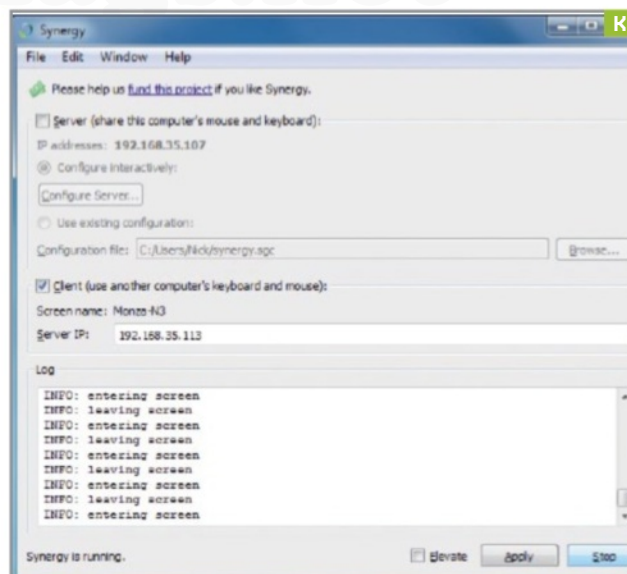
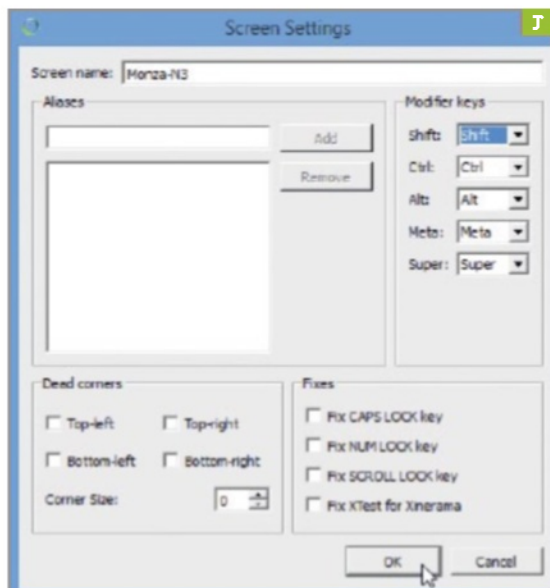
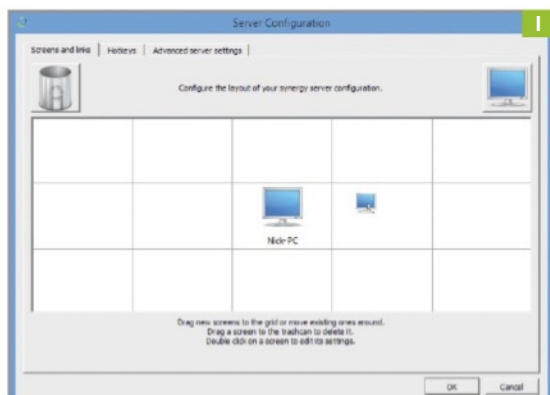


2 CONFIGURE SERVER AND CLIENT Switch back to your main computer and click the "Configure server" button in the main Synergy window. The "Screens and links" tab is where you tell the Synergy server where your client is physically in relation to it. To link clients to the server, click and hold the mouse on the screen button in the top right, then drag it onto the square that corresponds to your client computer's location (**Image I**). The relation of the two screens in this window will define how you move the mouse from one screen to the other, so make sure it matches your physical setup.

» Double-click the unnamed entry that appears to configure it for your client (**Image J**). Change its name to the screen name displayed in the Synergy window on your client computer and click OK. You can move this entry to another square by simply clicking and dragging it, or delete it by dragging it into the trash can. Once you're sure that the client is set up correctly, click OK.

» Now, click the Start button on your server PC and wait for the “watchdog status: ok” message to be displayed. Switch to your client and click the Start button there, too (Image K). If all is well, you should see a “Connected to server” message appear. Now, move your mouse to the edge of the screen corresponding to your physical layout—you should see the pointer jump to the other screen.

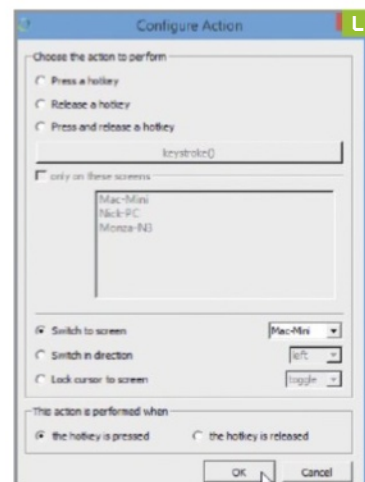
» You can now use your mouse and keyboard on the client PC exactly as if they were plugged into it directly. When you want to move control back to your original computer, just move the mouse back to the edge of the screen it came from originally—it will appear back on the original screen. The keyboard’s inputs will be received by whichever computer currently has the pointer. You can now minimize or close the Synergy window without losing the connection.



3 EXTRA FEATURES Synergy includes some very handy extra features for working on multiple PCs. For example, you can use the shared clipboard to copy text or images (or portions thereof) from one computer to another. Simply select and copy the text or image, then switch to the corresponding application on the other computer and press Ctrl + V to paste it into place.

» If you want to be able to control Synergy itself with keyboard commands, you can set up hotkeys to do so. On your server PC, click “Configure server” and switch to the Hotkeys tab. Click New under Hotkeys, click the “keystroke()” button, and press your chosen key or keys. Only use combinations not used on any of the systems that are using Synergy for sharing. Click OK, select the key, and click New under Actions. Define your chosen action—such as switching to another display—and click OK (Image L).

» Congratulations, you’ve successfully set up keyboard and mouse sharing between two computers. You can now repeat the process for other computers and laptops in your home, including Macs and Linux PCs, using the “Configure server” button on the server to choose which edge or corner of the screen to use to move between them. Your desk will never feel cluttered again!



Fine-Tune Your SSD

YOU'LL NEED THIS WINDOWS 7 OR 8

This how-to works with either.

UPDATED SOFTWARE

It's best to get the latest firmware for your SSD and update your chipset drivers.

THE INSTANT INCREASE in performance you get from switching from a hard disk to a solid-state drive is quite special. You don't notice an upgraded CPU in the same way (unless you're replacing a Pentium II), and as for RAM? Forget it.

No other component transforms your everyday computer use like an SSD, which is why making sure it's running as efficiently as possible is a worthwhile endeavor.

There's a mountain of advice out there from the Internet, the IT guy in your office, and the lady down the road in the tinfoil hat regarding proper maintenance of SSDs, and often their insights are conflicting. Should you turn off the page file or not? Is Windows 7 using the Trim command correctly, or do you need an extra software layer? We're here to help. —PHIL IWANUIK

1 GETTING STARTED First, let's establish what it means to "optimize" your SSD. Begin by forgetting those sequential read/write figures that manufacturers love to wheel out. They do so because a sequential-write time of 500MB/s sounds hella impressive, whereas a random-write time of 24MB/s sounds pretty pedestrian.

Guess which type of task your disk completes most often? Correct, the random writes. You can check this for yourself by downloading Diskmon (<http://bit.ly/1iSAiXv>)—a program that tracks every task your disk does as you go about your business for a few hours.

» Maximizing your random-read and -write times is a big part of SSD optimization, but it's not the whole story. Flash memory performance degrades over time, so it's also important to ensure you're not thrashing your SSD unnecessarily. Windows 7 was designed before solid state became the norm, so by default it does a number of things that are either superfluous or potentially damaging to your storage. Windows 8 isn't without its anachronisms in this area, either.

» There are a couple of areas to focus on that'll help to optimize your disk: motherboard spec and BIOS settings are the starting point, followed by tweaks to your operating system. From there you can try to get additional optimization from third-party software. Let's start with the nuts and bolts: getting your mobo and its BIOS to play nice with your drive.

2 CHECK COMPATIBILITY AND DRIVERS There's an excellent chance your SSD is SATA 3 compatible, which means its SATA port can throw data back and forth at a theoretical 6Gb/s. It's therefore paramount to make sure your motherboard also supports this interface—ideally natively rather than using a third-party controller. It's common in cheaper P67/Z68 chipsets to find only a Marvell SATA 3 port on your mobo, and these really lower your performance ceiling. If you're wondering why you can't replicate the advertised synthetic benchmarks, this is probably the cause. On anything later than Intel's Z68 platform there's a better chance of finding native SATA 3 ports, and boards built around AMD's 9-series chipset regularly feature as many as six. Now the first potential bottleneck is cleared, enter your BIOS and check

that you're running the disk in AHCI mode rather than IDE. Of these two standards, only the former enables SATA 3 functionality.

» Now that we're out of the BIOS and into Windows, it's a good idea to check that your chipset drivers are up to date. Most mobo manufacturers will host a page containing links to all the relevant firmware and drivers, and there's a chance the latest driver increases performance.

3 DISABLE UNNECESSARY WINDOWS SETTINGS Windows does an assortment of background tasks that are unnecessary for SSD owners—scheduling disk defrags, creating system restore points, constantly re-scanning data clusters so it can return search results quicker for you. It's time to turn all that off, and give your drive some peace and quiet.

» Let's start by disabling drive indexing, which does nothing for your SSD's response time, but increases writes. From My Computer, right-click your drive and hit Properties. At the very bottom is a checkbox that says "Allow files on this drive to have contents indexed." Uncheck it (**image A**). Hit Ignore All on the error message and wait a moment for the process to complete.

» While we're in the neighborhood, stay in the Properties window and select the Tools tab, then hit the Defragment Now button. We're not going to actually run a defrag, now or ever; it does nothing to improve performance and thrashes your drive for no reason. Instead, select Defragment Schedule and then uncheck any schedules lurking within (**image B**). That's a load off your SSD's plate.

» Next on the chopping block are prefetch and superfetch—processes designed to speed up search results by, yes, constantly thrashing your storage. In the Start search bar, type **regedit**, and when the registry editor opens, find the following file path: HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\SessionManager\Memory Management\PrefetchParameters.

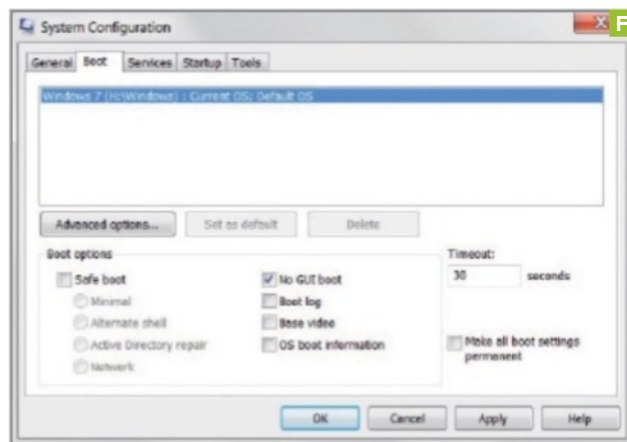
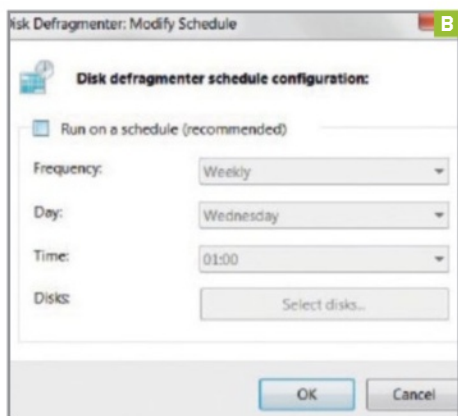
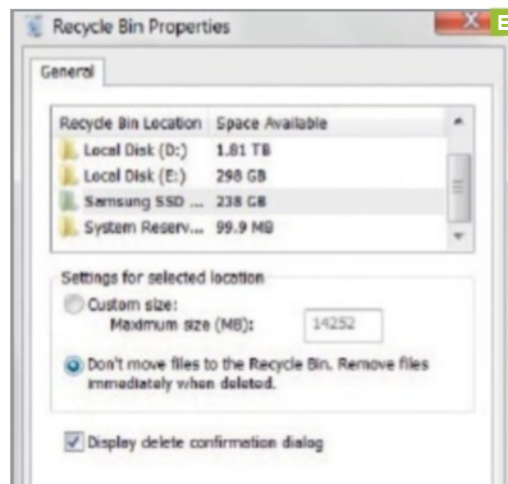
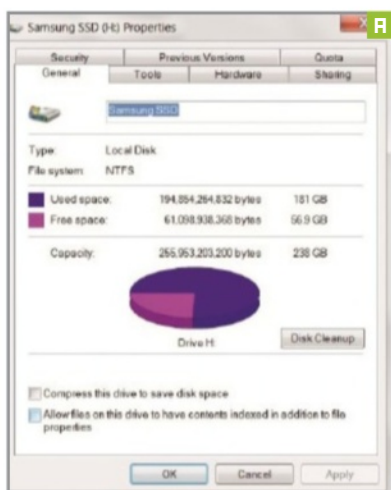
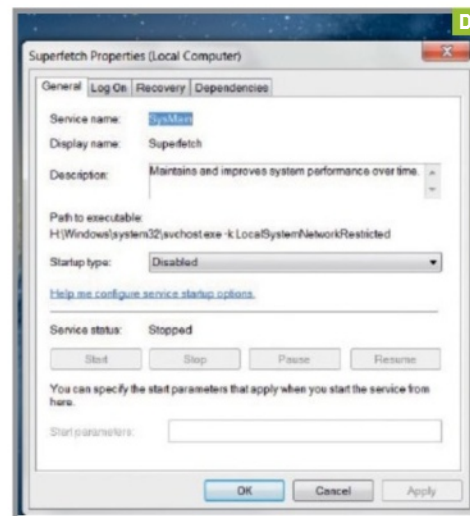
» Now, right-click both Superfetch and Prefetch to

bring up their modify windows, then change their values to 0 (image C). You'll need to do a restart for the changes to take effect. Once that's done, type **services.msc** into the Start search bar, then find both Superfetch and Windows Search and use their drop-down menus to set them to Disabled (image D). So long, super-thrasher.

» If you're feeling brave, you can disable the Recycle Bin, which helps the Trim command to do its thing and keeps the maximum possible disk space free. Just don't come crying to us if you delete something important. Right-click the Recycle Bin, then hit Properties, select your SSD and hit "Don't move files to the Recycle Bin" (image E).

» With Windows no longer beating your SSD like it's wearing a bow tie on its first day of school, all that's left is to boost your startup time. Type **msconfig** into Start search bar, then in the Boot tab, tick No GUI Boot to disable the Windows graphic and cut seconds off your boot time (image F). Untick any unwelcome programs in the Startup tab, too.

» With your BIOS and OS now tailored to your SSD's needs, you have created an environment in which it can perform random-read/write tasks as fast as possible but, crucially, only when those tasks are necessary. It's a win-win: lightning performance when you need it, with the longest possible lifespan. If you want to take it even further, there are options with third-party software, but by getting Windows in order and eliminating the possibility of a hardware bottleneck, you've done your drive a solid.



Edit Photos with Gimp

YOU'LL NEED THIS GIMP

This free, open-source photo-editing suite is available at www.gimp.org.

Even beautiful photographs can often be improved with some subtle editing tweaks. You can spend a small fortune on suitable software, but a free, open-source tool called Gimp includes nearly all the features you'd find in a professional package.

Whether you just want to crop an image or resize it for emailing, Gimp can help you do it quickly and easily. It's also great for boosting color saturation or brightening murky shadow areas, and with a little practice you can even edit out unattractive elements from an image, such as a piece of litter or a facial imperfection.

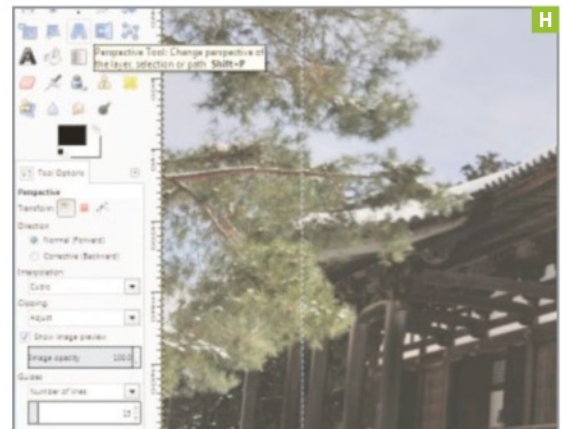
Gimp is packed with useful and fun tools to turn a dull vacation snap into a masterpiece, and while some features can be a little tricky to learn, the results will be worth the effort. It's also easy to use—with our help you won't feel intimidated by a huge array of options and complicated tools. So, without further ado, let's get editing! —BEN ANDREWS

CORRECTING VERTICALS AND CROPPING First, we like to customize Gimp's tool palettes to suit our working style. By default, these float in separate Windows, but to combine them with the image window, click the Windows tab on the top toolbar and select Single-Window Mode. Open your photo via the usual File → Open procedure and hit Ctrl + Shift + J to automatically zoom the image preview to fill the window space (**image G**).

» See those leaning wooden pillars on the left of the building? Let's correct these converging verticals by first creating some vertical reference lines. Click anywhere on the ruler located to the left of the image and drag it right, dropping a line roughly two inches from the right edge of the image. Now, drag a second line and drop it among the wooden pillars on the left.

» Press Shift + P to activate the Perspective tool (**image H**). Ensure the Clipping option on the left is set to Adjust, then click-and-drag the lower-left corner of the image directly to the right until the leaning pillars stand parallel with the left-hand reference line. Drag the bottom-right corner roughly the same distance to the left, then click the Transform button in the small pop-up window.

» To restore the rectangular framing, switch to the cropping tool by pressing Shift + C, then click the bottom-left corner of the image and drag up to the top-right to make a box that includes as much of the photo as possible while still excluding the diagonal edges (**image I**). Double-click inside the box to apply the crop, then resize the image preview again by clicking Ctrl + Shift + J.

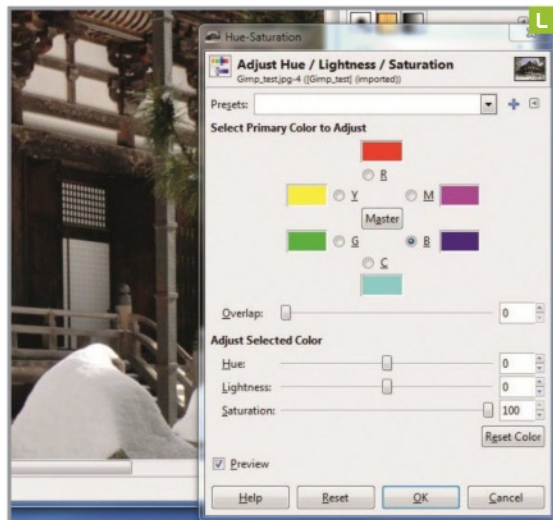
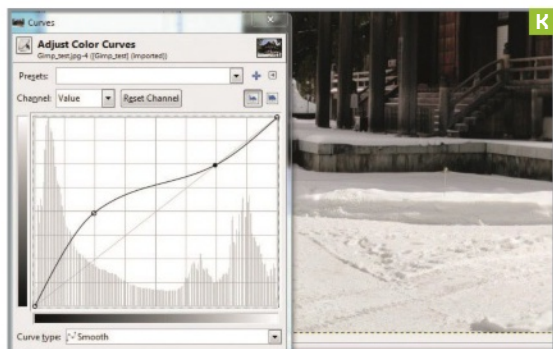
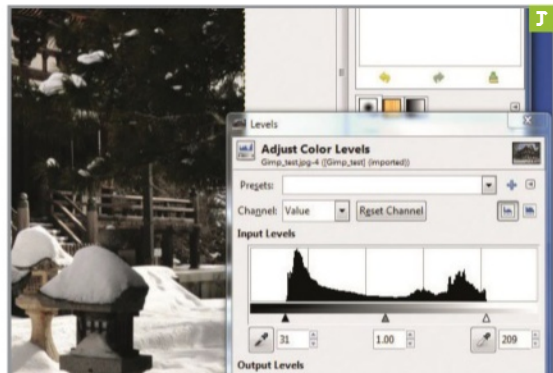


COLOR ADJUSTMENTS Landscape photos can often look hazy, with dull color saturation. We'll address this by clicking the Colors tab and selecting Levels. Notice the black-and-white Input Levels histogram graph and the three small triangle markers directly beneath it? Drag the left and right triangles so they line up with their respective ends of the black graph shape (**image J**), then click OK.

» Next, those dark shadows need brightening up. Back

on the Colors tab, opt for Curves. Click roughly a quarter up the long diagonal line and drag it straight up approximately two squares of the background grid. Now, click the same distance from the other end of our curve and drag back down to the original straight line (**image K**), restoring the highlight areas to their previous brightness.

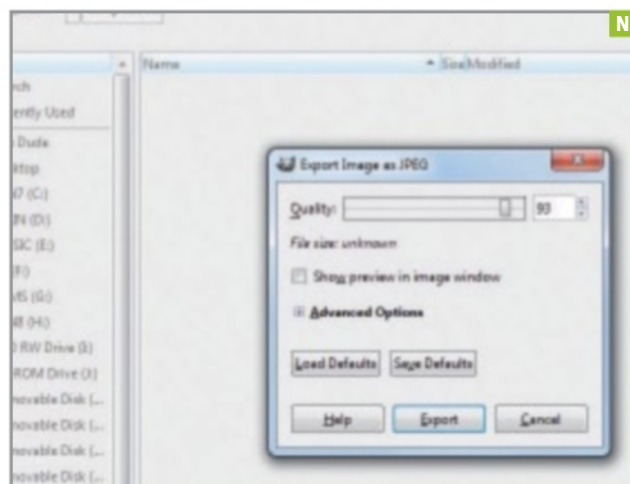
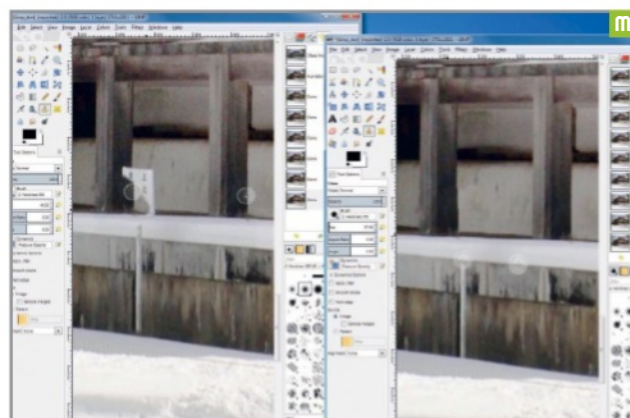
» Now we're getting somewhere! However, the area of blue sky is still slightly dull. You can increase the saturation of this specific area by clicking the Colors tab again and selecting Hue-Saturation from the menu. In the new window, choose the blue color (not cyan) and slide the bottom Saturation slider all the way to the right (**image L**). Click OK to apply the changes.



3 ADVANCED EDITING Let's try digitally uprooting that small sign in front of the building. Press C to switch to the Clone Stamp tool, then tap 2 to zoom in to 200 percent for a better view. Find the sign by holding down Space and clicking-and-dragging the image. Position the cursor so the dotted circle is centered on the bottom-right corner of the wooden pillar, just to the right of the sign.

» Press and hold Ctrl, click once, release Ctrl, and align the cursor as best you can in the equivalent position over the pillar behind the sign. Click, drag, and paint over the sign (**image M**). To remove the sign's pole, find a new reference point that's about an inch to the left or right of the pole and again press Ctrl and click. Move your mouse to the matching position on the pole and paint it out.

» To save your completed image, ignore the obvious Save option on the File tab and instead select Export. Name your file something different from the original, click Export, and ensure the Quality slider is set to 90 or higher (**image N**). Finally, click Export again to complete the save. Now you can sit back, flick between the original and edited images, and admire what you've achieved! 🔌



Set Up a Virtual Help Desk

YOU'LL NEED THIS WINDOWS 7 OR NEWER

A SOLUTO ACCOUNT

To remotely diagnose problems using Solutio, set up a free account: www.solutio.com.

HAVE YOU EVER TRIED to troubleshoot a PC problem over the phone? The experience can be frustrating—not just for you, the expert, but also for the inexperienced user at the other end of the line. For a novice user, simply describing the problem they're having can be difficult, and executing a complicated fix harder still.

In this article, we'll show how anyone can use a built-in Windows utility to easily record a problem they're experiencing, or to create a step-by-step guide for fixing it. For more difficult issues, we'll show you several ways to take control of a friend or family member's PC, so you can fix the problem for them. —MAYANK SHARMA

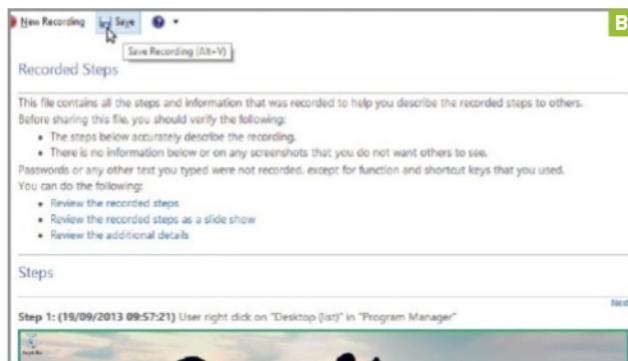
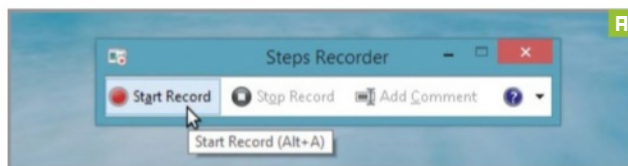
1 USE WINDOWS STEPS RECORDER First, we'll talk about Steps Recorder, a nifty little app included with recent releases of Windows to streamline the process of reporting and resolving issues. It's a troubleshooting and assistance utility that is, in effect, a combination of three tools: a keylogger, a screenshot utility, and an annotation tool. Steps Recorder comes in handy for documenting errors that can be reproduced. Using the tool, you can retrace the exact steps that led to the trouble.

» The tool automatically takes screenshots that you can annotate, and logs details about the system, including the names, locations, and versions of all the apps that you access. It then packages the recording in an easily transportable file, which can be sent to an experienced user, who can then retrace the steps to assist in resolving the issue.

» In order to use the Steps Recorder, the person having a PC problem needs to type "record" in the Windows 8.1 Start screen and launch the tool. The tool is a small window that has controls to record your desktop session. Click "Start Record" to begin capturing the desktop (Image A).

» Now, they should perform the same steps that result in the problem. While recording, every mouse click takes a screenshot, and the "Add comment" button can be used to describe the problem in detail. There are also buttons to pause and resume recording.

» When they're done, they should click the "Stop Record" button. The tool enables them to review the recorded information (Image B) and then prompts for a name and location to save the recording, where it's saved as a zip file.



2 USE THE WINDOWS REMOTE ASSISTANCE FEATURE

Unfortunately, some computer problems might be too unpredictable to record with the Steps Recorder, or the solution may be too complex for you to describe through an email or over the phone. For resolving such issues, you need the Windows Remote Assistance feature. Using this tool, anyone can be invited to take over the misbehaving computer, via the internet. The invited expert can then view the desktop of the malfunctioning machine and even take control of it and operate it remotely to sort out the problem.

» However, before that can happen, the person you wish to help must ensure that their computer is set up to be accessed remotely. To do so, they should search for "remote" in the Windows 8.1 Start screen, then in the Settings results list, click on "Allow remote access to your computer." This takes them to the Remote tab under System Properties. Here, they need to make sure that the "Allow Remote Assistance connections to this computer" checkbox has been selected.

» While they're here, if you plan on using the Windows Remote Desktop Connection tool (more on this later), they should also select the "Allow remote connections to this computer" option.

» Once their PC is accepting remote assistance connections, they can invite others to help. To put out a call for help, they should fire up the Windows Remote Assistance tool: Type "assist" in the Windows 8.1 Start screen, and in the Settings results list, select the "Invite someone to connect to your PC and help you, or offer to help someone else" option.

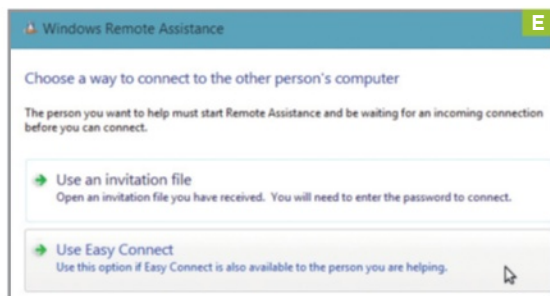
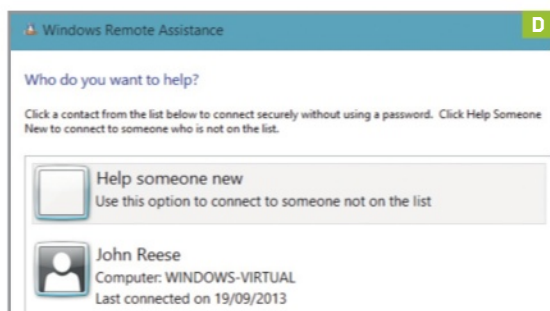
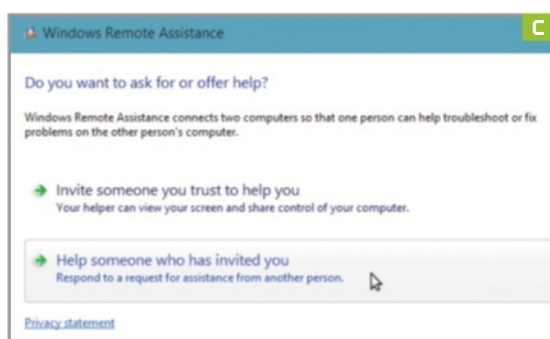
» Windows 8.1 now prompts with a "Do you want to ask for or offer help?" dialog. Here, they need to select the "Invite someone you trust to help you" option. They are now given three different options for sending out the invitation: save the invitation as a file that can be sent via Windows Live Messenger, email the invitation directly, or use Easy Connect.

» Easy Connect is a mechanism for connecting two computers for the purpose of providing remote assistance. The option to connect via Easy Connect is available only if both computers are running Windows 7, 8, or 8.1. There is no need to send out an invitation. The person requesting assistance is shown a 12-character password, which they must then pass on to the person who is offering them assistance.

» On your end, search Settings for "assistance" and

then click “Invite someone to connect to your PC and help you, or offer to help someone else” (**Image C**). Selecting this opens up the Windows Remote Assistance wizard for you. Now, click “Help someone who has invited you,” which shows you a list of people you’ve helped before. Because this is the first time you’re using the program, you won’t see any names; click “Help someone new” (**Image D**).

You now need to select a way for connecting to your friend’s computer. If you’re both using Windows 7, 8, or 8.1 on your machines, use the Easy Connect option (**Image E**) and type the password your friend has shared with you. Once you’re connected, you can view your friend’s desktop (**Image F**). You can use the “Chat” button to exchange text messages with your friend. If you need to take control of their machine, use the “Request control” button.



3 TAKE CONTROL USING WINDOWS REMOTE DESKTOP CONNECTION The Windows Remote Assistance tool is best suited for solving one-off queries. If you regularly need to help the same person with computer problems and guidance, you’re better off using the Windows Remote Desktop Connection tool. Accessing a computer by establishing a Remote Desktop Connection works as if you’re sitting right in front of that computer, allowing you immediate access so that you can enter commands and make fixes.

» To launch the tool, type “remote” in the Windows 8.1 Start screen and select the Remote Desktop Connection app. Now, click “Show options” to set up the tool. The Remote Desktop Connection tool has a very extensive multi-tab configuration panel. In the General tab, enter the name of the remote computer that you wish to connect to. In the username field, you need to enter the username of the user who has administrator privileges on the remote machine. You’re prompted for their password when connecting.

» When you’ve entered all the necessary details, click “Connect” to establish a connection with the remote machine. You’re then prompted for the credentials of the remote user you specified. Ignore any certificate errors and choose to establish the connection. When connected, the remote desktop appears as per the display settings.

» Finally, a couple of quick tips. When someone invites you to help them, if the invitation attempt fails, check whether their firewall is blocking connections. They can also click “Troubleshoot” on their end and follow the instructions to resolve the issue.

» If bandwidth is a problem when using the Remote Desktop Connection tool—which it might be if you’re dealing with a 1080p monitor—you can switch to the Display tab and reduce the resolution of the remote machine.

4 TROUBLESHOOT REMOTELY WITH SOLUTO There are also lots of third-party tools for remotely accessing a machine. Soluto is designed to flag and troubleshoot common issues on remote PCs. With Soluto, you can manage a bunch of PCs, and the scanner you install on the machines you are supporting flags any potential issues.

» To get started, head to www.soluto.com and create an account with the service by using your Facebook or email details. After logging in, you’re taken through a getting-started wizard. You can safely skip all the steps in the wizard and go straight to your Soluto dashboard.

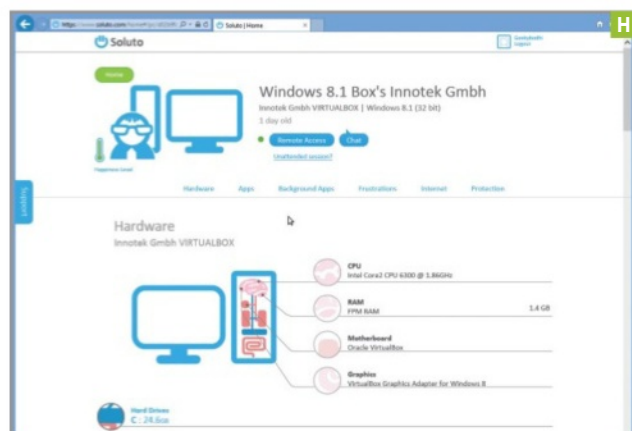
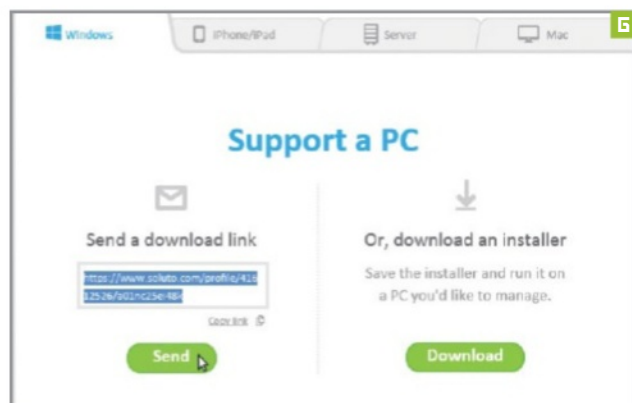
» You can now start adding devices. Click “Add PC/iPhone/iPad” in the dashboard and then select the appropriate tab for the type of device you want to add (**Image G**). You can add a friend’s Windows PC by sending them an email from here.

» Soluto sends an email to your friend, with a link to download the Soluto scanner onto their machine. The software informs you once your friend has accepted your request to assist them and downloaded the software. (This might be a good time to remind your friend or relative that under normal circumstances, they should never install software just because an email tells them to.)

» In the Soluto dashboard, you can now click on your friend’s machine to analyze it in detail (**Image H**). (For the purpose of this how-to, we remotely accessed a virtual machine.) Soluto informs you about the available resources on the remote machine and whether there are any updates available for the installed apps, and even lets you install more.

» The best thing about Soluto is that it flags any issues it encounters. For example, it lets you know if it finds any apps that are slowing down boot time and can be safely turned off (**Image I**),

or if the hard disk needs to be defragmented. You can also access the remote computer, which displays its desktop in your web browser. By default, Soluta asks for permission from your friend before sharing their desktop, but if they want, they can allow you to access their PC at any time.



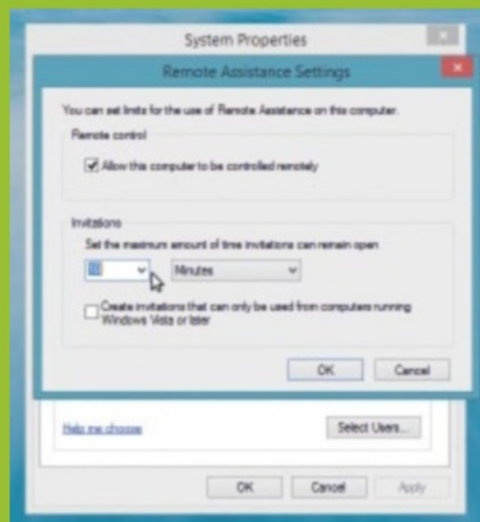
A WORD ABOUT SAFETY

Making it easy to allow others to gain access to your computer remotely might seem like a very bad idea from a security point of view. After all, what's to stop them from going through your files?

Don't fret. Microsoft has built in several mechanisms to protect you. First of all, the Remote Assistance tool allows only remote connections that you invite. Secondly, you can configure the tool so that it sends only invitations that expire if they are not used within a set time limit, such as 10 minutes.

Also, unless you explicitly allow the remote user to manipulate your computer, they can only view your screen. Even then, you can still see what they are doing with your PC in real time, and can close the connection as soon as you get a whiff of something fishy.

A Remote Desktop Connection is more forgiving and should therefore be used only to give access to people with whom you can trust your data.



Reduce Your PC's Power Usage

YOU'LL NEED THIS WINDOWS

Any version of Windows from the last decade will have the features used in this article.

Utility bills are always on the rise, and we're all becoming more aware of the power used by our devices in and around the home. Indeed, many utility providers now give away monitors that enable you to see just how much power is being used at any one time. Getting your computer to reduce the amount of juice it's drawing, while not affecting the way you use it, is not only good news for your fuel bills, it can also reduce your carbon footprint, too.

Thankfully, there's plenty you can do with your computer to make sure that it's only using the power it needs to function. In this tutorial, we're going to take you through the various power profiles within the Windows operating system that enable you to tailor the power requirements of your machine—without having a negative impact on its overall responsiveness.

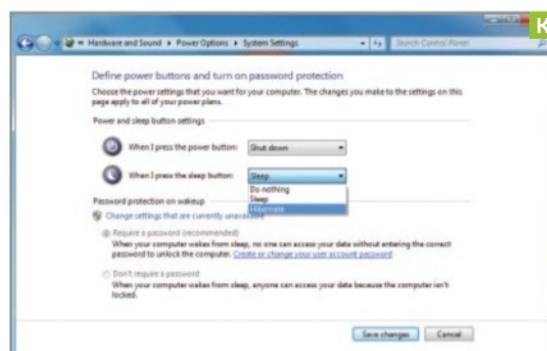
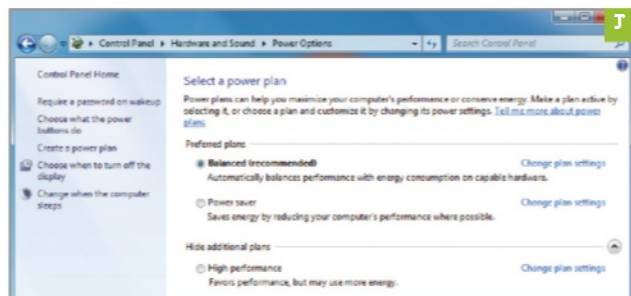
1 TWEAK YOUR POWER PROFILE Windows boasts three separate power profiles that can help you get more from your home machine. These are defined as Balanced, High Performance, and Power Save. To access these profiles, you need to enter the Power Profile Manager by selecting "Start → Control Panel → Hardware and Sound," then click the "Power Options" section.

» By default, the Balanced (and most recommended) profile is in place (**Image J**), marrying performance with energy consumption. Power Saver improves your machine's power consumption by being a little more aggressive with powering down and idling. The High Performance option ignores power saving and allows for the top performance possible from your PC.

» These defaults are good starting points, but if you want real control over your power usage, you're better off creating your own power profile. Click "Create a power plan" in the left-hand panel, select "Power saver" as your starting point, and name it "Super Power Saver" before clicking "Next."

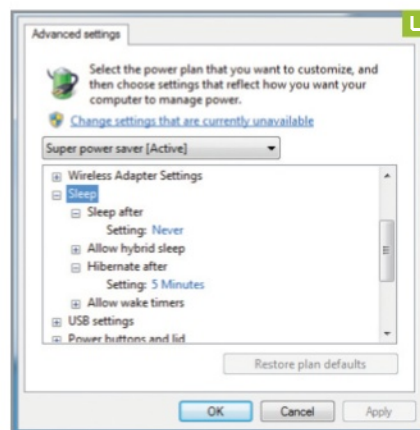
» On the next screen you can define how long the machine should wait before moving into sleep mode. We recommend setting the "Turn off the display" option to 1 minute, and the "Put the computer to sleep" setting to 5 minutes. When you're done, click the "Create" button.

» Hibernate is a special power saving mode that turns off the power to your PC almost completely. You can configure your machine so that it uses this mode instead of going to sleep for better power-saving results. Select "Choose what the power buttons do" and set the "When I press the sleep button" action to "Hibernate" (**Image K**).



2 ADVANCED OPTIONS Now to pull out all the stops. Click "Change plan settings" to the right of your Super Power Saver profile and then select the "Change Advanced power settings" option at the bottom of the screen. Expand the "Hard disk" entry and set the drive to turn off after 10 minutes or so. Next, expand the "Sleep" option, delete the number of minutes in the "Sleep after" option, and set "Hibernate after" to 5 minutes (**Image L**). Click the OK button.

» If you're using a laptop, you can define what happens when you close the lid, too. Click "What happens when I close the lid" to the left of the window. You'll find two options here, battery or plugged into a power socket. Click the "On battery" option and set it to "Hibernate," and leave "Plugged in on sleep" enabled.



Stay Anonymous on the Web

YOU'LL NEED THIS

TOR BROWSER BUNDLE

A browser ready to use Tor anonymization out of the box—no configuration necessary. Get it for free at <http://bit.ly/gWL2oF>.

TAILS OS

This live operating system can be run from a DVD, and anonymizes all your incoming and outgoing data using the Tor network. Get it free here: <https://tails.boum.org>.

IF YOU'VE BEEN following the news since this summer, you know that privacy on the Internet is something you shouldn't take for granted. Even basic computer safety (safe passwords, no open Wi-Fi networks, etc.) isn't enough to keep your online data safe from Big Brother's prying eyes. If you're not OK with your online life being an open book, you should learn to use Tor—the most secure web anonymizer around.

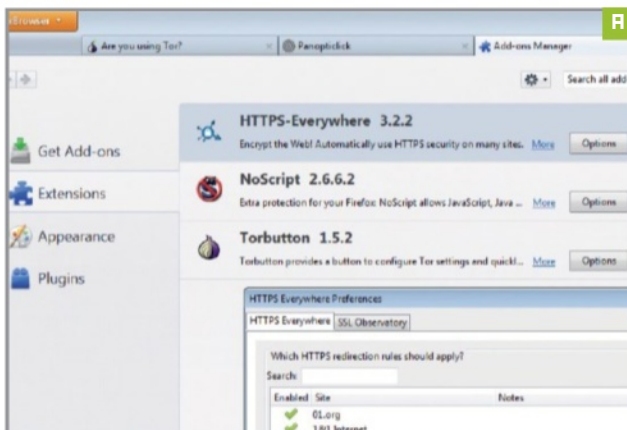
How does Tor let you browse anonymously? Imagine you're in a crowd. You give a parcel to person A, and they take it and a secret delivery card that says to take it to a random person (we'll call them B). Person B removes the security wrapping paper and gets another encrypted card telling them to take it to another random person (we'll call this one C). Another layer of security paper is removed by C, revealing the final destination and the contents. A and B can have no idea what the destination is, B and C have no idea where it came from, and A and C have no knowledge that the other exists. Tor uses a similar process, sending your data through a number of random nodes before it reaches its destination.

Tor certainly has its limitation and shortcomings. Like all things Linux-based, it's overly technical, and its unintuitive installation could be another major obstacle. The Tor project has done a good job of circumventing this complexity, mainly by supplying an easy-to-use browser and live CD-based solutions. We're going to take you through using both. The browser is fine for web-based action, while the live CD offers a full, working Linux installation with Tor installed as the Internet proxy alongside suitable services. This can also be easily installed via a USB drive or permanent system. —NEIL MOHR

1 USE THE TOR BROWSER BUNDLE Download and extract the Tor Browser Bundle from www.torproject.org. In the Tor Browser folder, run StartTorBrowser.exe. The Vidalia Control Panel appears and will make a connection to the Tor network. This can take a few seconds. When the Tor Browser opens, it's simply a branch of the Firefox code, specifically configured to use the Tor network with a number of pre-configured plugins.

» The Tor Browser lets you know what your “new” IP address is; as you go from site to site this is what's recorded, rather than your real IP. Click the top-left Tor Browser button and select Add-ons (**image A**). You'll then find the three default plug-ins that come with it: HTTPS-Everywhere forces encrypted web transfers, NoScript blocks tracking and malicious scripting, and Torbutton offers quick settings.

» The Tor network itself needs no configuration—the browser will merrily work away as it stands. The Vidalia Control Panel offers complete control and reporting of the network status. There's also an accurate bandwidth monitor and an interesting Network Map showing how the Tor network is built up.



2 RAMP UP WITH TAILS TOR OS For more than simple browsing, the Tails Tor OS is the most secure option available to you. It's a Linux operating system that uses the Tor network to anonymize all incoming and outgoing traffic. You can run Tails directly from a USB drive or DVD, or as a virtual machine in VirtualBox (available for free at www.virtualbox.org).

» Whichever option you choose, you'll need the Tails OS ISO, which you can download at <https://tails.boum.org>. If you're using VirtualBox, click New, type **Tor** then select Next > 512MB > Next > “Do not add a virtual hard drive,” and click Create. Select the new Tor machine and click Settings > Storage > Empty > Live CD/DVD—you'll then need to select the Tails ISO image file and click OK (**image B**).

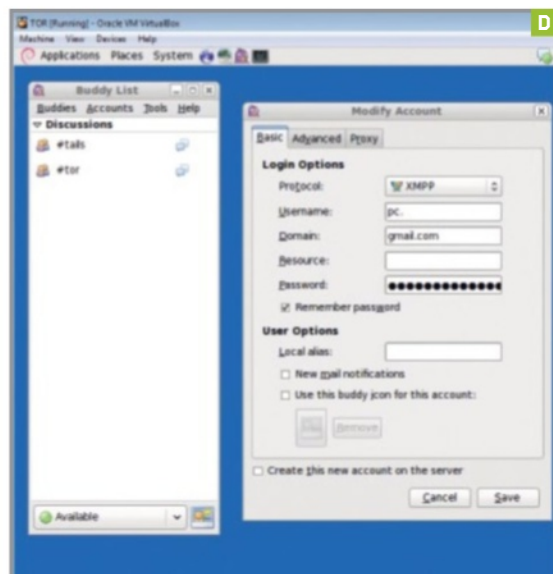
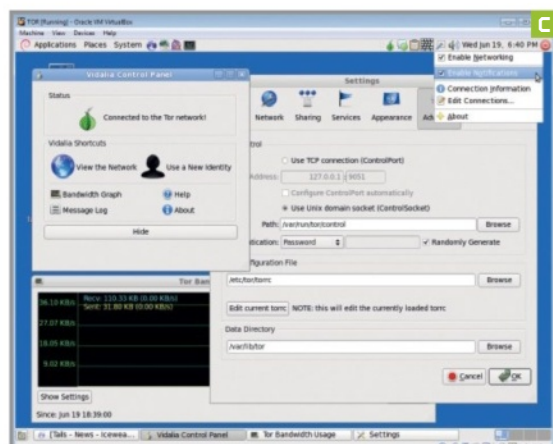
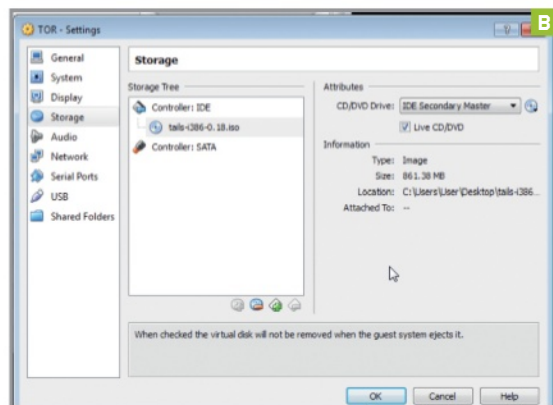
» Everything that follows will work if you run Tails from a DVD or USB key, but we'll be using the virtual machine for ease of access. Double-click Tor and allow it to boot. You can also opt for More Options and set an admin password required for adjusting further settings.

» After a minute or so, Linux and the Iceweasel Tor browser will spring into life, alongside a number of pop-up messages about time and virtual-machine warnings. In VirtualBox, use Ctrl+F to toggle Fullscreen mode or Ctrl+S to toggle Scale mode. You can even adjust the screen resolution within the OS by clicking System > Preferences and selecting the Monitors menu.

» Look for the little green Vidalia onion icon in the top taskbar—this gives you access to the same Control Panel we covered using the Tor Browser Bundle, with bandwidth, network, and the ability to establish your system as a Tor relay. The network icon next to this is handy for quickly establishing if the virtual network port is connected, in case there are any issues (**image C**).

» The instant messaging tool Pidgin is a key part of Tails (**image D**), and includes built-in OTR encryption and an email client. Pidgin supports MSN, ICQ, IRC, AIM, and Jabber protocols by default. The OTR aspect enables end-to-end encryption of conversations when used with other OTR users. To enable it, select Pidgin Tools from the Plug-ins menu.

» Tails also comes with the email client Claws. This isn't meant to be anything special, but it's also set with the OpenPGP variant GnuPG, which enables two-way auto-encrypted email. Alternatively, there's the gpgApplet clipboard, which offers basic encryption of text via a pass phrase or public key. The output can then be safely emailed, too.



3 ADDITIONAL PRIVACY TOOLS IN TAILS The site www.duckduckgo.com has been around for a while, and its key selling point is anonymous search, which is why you'll find it in the list of the Tor Browser search engines by default. Couple its anonymous search with encrypted access and this is about as good as it gets for general searching online. It's not as capable as Google when it comes to complex queries, but it's good for general search.

» If you plan to take Tails out and about on a USB drive, it would be very wise to at least encrypt a data partition. Tails comes pre-installed with LUKS, a standard Linux disk encryption system. Select System Tools and click Disk Utility to create a partition that has encryption enabled (**image E**). This will become available via the Place menu, and will protect any files if the drive is lost.

» When Tails starts, you'll see an onscreen keyboard appear briefly—this is Florence, the virtual keyboard. You can access Florence via the keyboard icon in the taskbar. You might think it's there as a fallback or for accessibility reasons; it's actually there for the super-paranoid and anyone who suspects that a keylogger could be deployed on their system.

» For the live CD, secure wiping isn't an issue as nothing from the session can be stored. However, if you were running this from a USB drive, Tails offers two options for secure deletion. Right-click on a file and select the Wipe option—it defaults to two passes so you can ignore the Gutmann 35 option (that's an urban myth, anyway). The "Wipe available disk space" option is for an entire drive.



Get Faster Boot Times with Autoruns

YOU'LL NEED THIS AUTORUNS

This free application from Microsoft will help you eliminate unnecessary startup programs. Get it at <http://bit.ly/J4fvz>.

WINDOWS LOVES to run things. Programs, background tasks, drivers for things you aren't using, plugins for browsers you'd never use in the first place—it'll run them all, and at start-up.

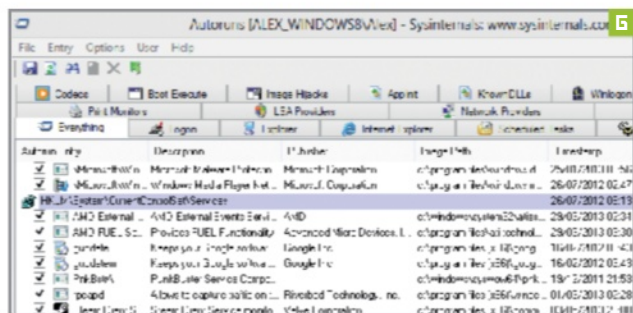
If you're energy-conscious and switch your PC off completely when you're not using it, a full restart can take forever—even on Windows 8—if you've stuffed it with enough program installs.

The key to preventing this is to take charge of what Windows runs and when. It's often quite safe to disable many of the items set to autorun, which means your machine will get a noticeable speed boost on boot, and when you run certain programs, too. All you need is a program called Autoruns (which is completely free) to make a nondestructive change. If you find your machine doesn't run as it should when you've switched off a few things, just turn them back on. —EDGAR SMALLS

1 INSTALL AUTORUNS Autoruns is part of Microsoft's Sysinternals suite, which also contains a host of useful programs. You'll find the file online and you can download it from <http://bit.ly/J4fvz>. Open it up and drop autoruns.exe somewhere you can easily find it. It doesn't need installing, so you can keep a copy handy on a USB stick, too.

» The first time you fire up Autoruns, it searches all of the locations it knows of in your Registry in order to find every entry that it can manipulate—items that automatically run, or those that hide in the background. This can take a while to complete, but eventually you'll see the list begin to populate (**image G**).

» The first list you see corresponds to the Everything tab at the top of the interface, but it can be a little complicated to find what you're looking for. Click through the other tabs—paying particular interest to Logon—to see the items that are loaded at certain times, and which are related to a particular program or purpose on your PC.



2 DISABLE UNWANTED STARTUP ITEMS Click the Logon tab to see the programs that run when your system starts up. These could include configuration tools for your graphics card, cloud services like Dropbox, and helper applications for services such as Spotify, Steam, etc. From here, you can uncheck a box next to each option and personally determine what runs during your start-up (**image H**).

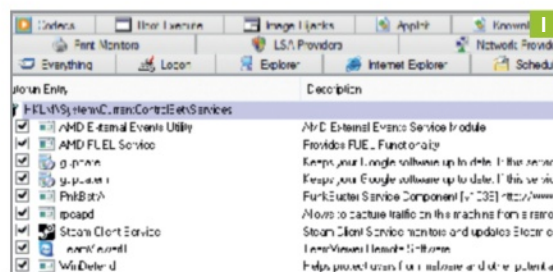
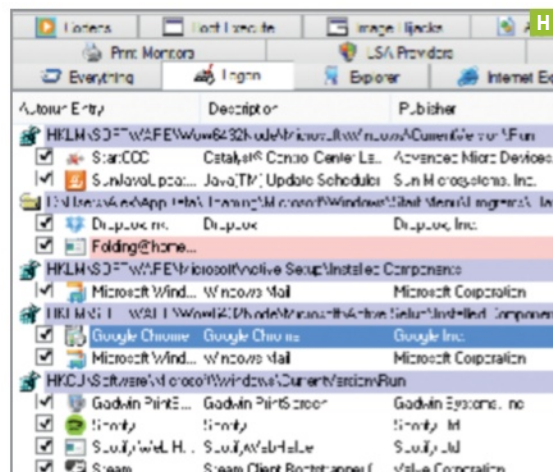
» Click the Explorer tab and look at the list. Chances are, you've installed a program or two that integrates itself with Windows Explorer in some way, probably in a right-click menu. You can choose to disable those menu entries in this tab without removing the program itself, which is handy if you like streamlined menus.

» The Scheduled Tasks tab lists everything set to run automati-

cally in the future. While we wouldn't say that Autoruns is the best tool for managing these tasks—you're better off using the respective configuration tools—it's a handy way to make sure your computer is running at maximum efficiency.

» Services are small programs that run in the background of Windows, usually without any sort of interface or other indication that they might be there. Look at the Services tab to see what your machine is hiding (**image I**). We'd generally recommend leaving these switched on, since some of these services perform a valuable function.

» Changes are saved as soon as you make them, but you'll need to restart your computer to see their effects. You should notice an increase in boot speed, and the other changes you've requested should be made. If anything doesn't work as it should, simply re-enable some of the items you've disabled. ☺



Keep Your Data Secure with TrueCrypt

YOU'LL NEED THIS

TRUECRYPT

This free encryption program is available online at www.truecrypt.org.

IF YOU'VE BEEN following the news lately, you might be under the impression that your private data is an open book to any number of corporations, government agencies, and shadowy hacker cabals. And while it might be true that you can't guarantee the sanctity of any particular online account, you still have the power to keep any of your data safe from prying eyes. How? The solution lies in encryption—the process of scrambling the contents of a file to prevent anyone from reading it unless they provide the correct “key” to unlock it. This is typically a password, a file, or a combination of both.

Encrypting your files and documents on the fly is quick and easy, thanks to a free program called TrueCrypt. You simply set up an encrypted drive or file container, which holds all your sensitive files. When the container has been unlocked you can access its contents like any other drive on your computer. Close the container and not only do the files become inaccessible, they disappear from view, too. Better yet, the encryption in TrueCrypt is military spec—the NSA, the CIA, and S.H.I.E.L.D. could all get together and they wouldn't be able to get into a file properly secured with TrueCrypt. In this guide, we'll tell you everything you need to know to lock down your files. —NICK PEERS

1 INSTALL TRUECRYPT Download the TrueCrypt installer from www.truecrypt.org and run it. Follow the prompts, leaving the default settings as they are (or you may wish to uncheck the desktop shortcut option), before clicking Install. Once TrueCrypt is on your system, click OK, followed by Finish. Read the beginner's tutorial when asked, if you want to familiarize yourself with it, then launch TrueCrypt.

» You can also choose to run TrueCrypt without installing it. This is a great option if you want to keep encrypted files on a USB drive or other removable media, as it allows you to keep the TrueCrypt software with you, so you can access the encrypted files from any computer.

2 CREATE AN ENCRYPTED VOLUME With TrueCrypt installed, click the Create Volume button to get started. You have two basic choices: If there's data already on the drive that you don't want to lose, leave “Create an encrypted file container” selected and click Next (**image A**). This will create a virtual, encrypted disk that you can open at any time (with a password) and store sensitive files in. To encrypt an entire drive or partition, wiping any existing files from it in the process, choose “Encrypt a non-system partition/drive” instead, followed by Next.

» Click Yes if prompted by the UAC dialog box. Two types of volume can be created. To simply protect the data if the drive it's on is lost or stolen, leave “Standard TrueCrypt volume” selected and click Next again (**image B**). Advanced users may want to choose “Hidden TrueCrypt volume,” which allows you to create a second, dummy password that can safely be given out under duress. When the dummy password is used, a secondary TrueCrypt volume will be decrypted. By filling this secondary volume with files that look sensitive but actually are not, you can create plausible deniability if an enemy actor knows that you're using TrueCrypt. Assuming you're not James Bond, a standard TrueCrypt volume is all you need, and it's what we'll cover in the rest of this guide.

» Click the Select File button, browse to the location where you want to store your encrypted volume, and then type a new name into the File Name box (**image C**). Avoid using a file extension, as

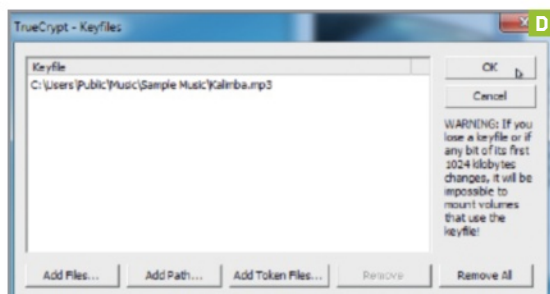
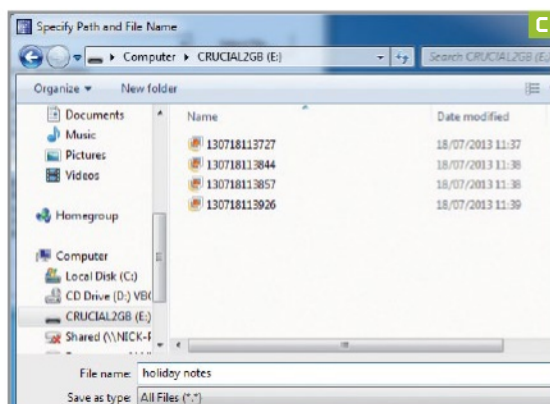
this can be problematic. Click Save, followed by Next to set up your encryption options for the volume. If in doubt, the default options should be fine for most people. Click Next to continue.

» If you're creating a file container, you'll be prompted to set a size for it. Choose a suitable figure, depending on how much data you need to encrypt and how much free space is available. Click Next to enter a password. You'll need this to access your files in the future, so make sure it's memorable, but also tough to crack. A weak password makes even the strongest encryption breakable, so try to make it at least 20 characters.

» For additional protection, check Use Keyfiles before clicking the Keyfiles button. Select at least one file—any will do (**image D**). In the future, your encrypted drive or container can only be opened by selecting that file and entering the correct password. This adds another layer of security to your files, but make sure the file is accessible when you need it. Then click OK, followed by Next.

» Move your mouse within the TrueCrypt creation window for a while to generate a strong cryptographic key (**image E**). When you're ready, click Format and the encrypted volume will be created. Wait until the confirmation dialog box appears, then click OK followed by Exit to return to the main TrueCrypt window, ready to access your encrypted container for the first time.

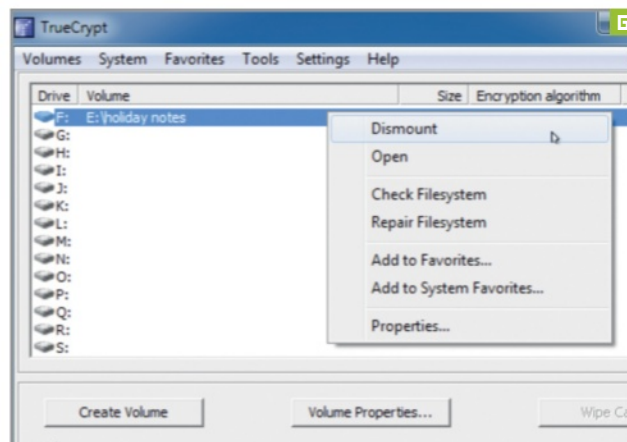
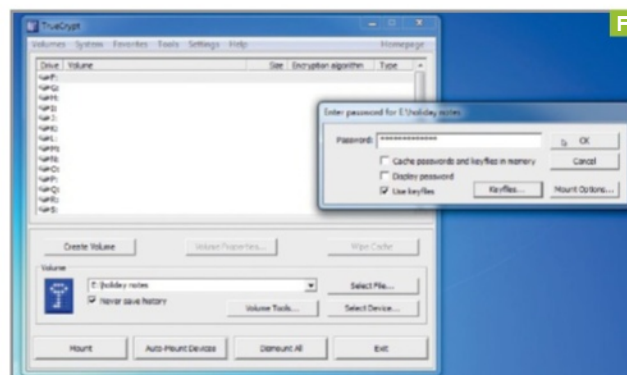




3 ACCESS YOUR ENCRYPTED VOLUME In the TrueCrypt client, select a free drive letter from the list. Click the Select File button to choose your encrypted container, or click the Select Device button to access an encrypted partition or drive. Click the Mount button, then enter the password and, if applicable, click the Keyfiles button to select the files that will give you access to your container when you click OK (**image F**).

After a short pause, you should see your encrypted container appear in the main TrueCrypt window. It can now be accessed like any other drive. Copy or save files directly into here to ensure they're protected in the future. When you've finished with the drive, right-click its entry in the TrueCrypt window and choose Dismount to lock it away from prying eyes (**image G**).

Now your files are safely stashed away behind TrueCrypt's ultra-tight encryption, and you can relax when moving them from one place to another. Without the correct password and keyfiles, no one else can gain access to your data, so even if you misplace your USB flash drive or find it's fallen into the wrong hands, your documents will remain strictly for your eyes only.



Optimize Your PC with CCleaner

YOU'LL NEED THIS CCLEANER

This system-cleaning utility is available at www.piriform.com/ccleaner. The site will encourage you to download a paid version, but there's a free version available, as well.

WE LOVE USING Windows, but the fact remains that after a while, it can start to slow down. It has to do with the way Windows handles programs, and simply using it on a day-to-day basis can result in an accumulation of unnecessary registry entries and files.

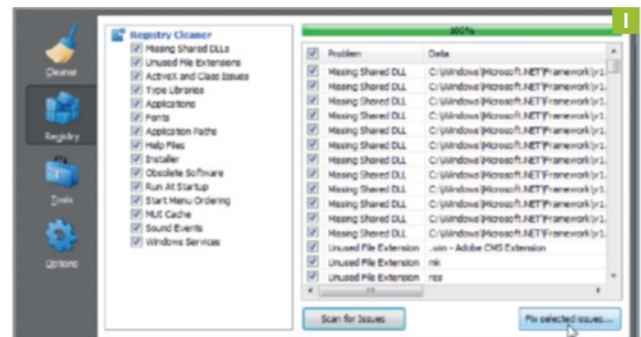
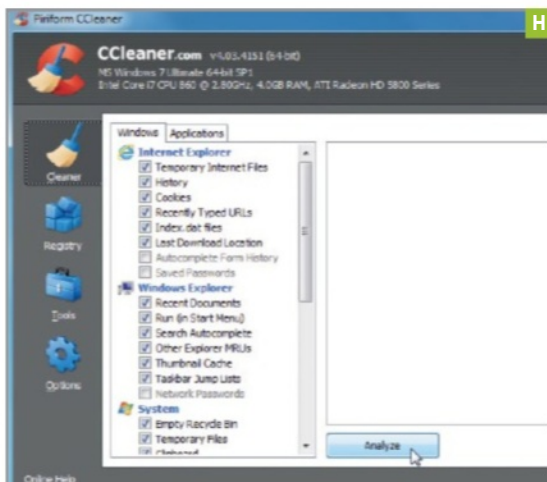
We'll show you how you can use CCleaner to clean up (and likely speed up) your system right now. —HENRY WINCHESTER

1 RUN A BASIC SCAN You'll find the latest version of CCleaner at www.piriform.com/ccleaner. Click Download, then choose one of the links in the Free section. You'll be taken to an external site where you can click a link to download the software. Once it's downloaded, select Run or Open. Click Next → Install and select Finish. The software should now start downloading automatically.

» CCleaner will also launch automatically. Click Yes for an "Intelligent scan" and you'll be presented with the main Cleaner screen. This will remove temporary files, delete Internet cookies, and empty the recycle bin, all of which can free up lots of space on your computer. Click Analyze to see what's going to be removed (**image H**), then select Run Cleaner when you're ready.

» CCleaner will now trawl through your computer and remove lots of unnecessary files. This may take a little while, and it might prompt you to close programs so it can purge them of useless stuff. When it's complete, you'll be able to see details of the files CCleaner has deleted, as well as the total space it freed up. To proceed with the process, click Registry.

» The registry contains all the little bits of information about your computer that programs need to work, but it can also fill up with unnecessary data. Click "Scan for Issues" to see the bits and bobs that CCleaner finds, followed by "Fix selected issues" to remove them (**image I**). Click Yes, when prompted, to back up these changes, then select "Fix All Selected Issues" to begin the cleanse.

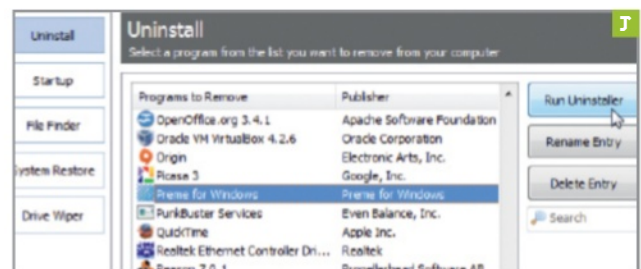


2 MANUAL CLEANUP Click Close once the registry's been tidied up, then select Tools → Uninstall. This handy list includes all the programs currently installed on your PC. Scroll through it, keeping an eye out for programs you no longer use. If you find any, click the entry and click Run Uninstaller to the right (**image J**) and follow the instructions to remove the program.

» In the Startup area, you'll find the programs Windows loads at boot. Having a program launch automatically can save you time, but it can also slow things down considerably. It's not a good idea to disable all of them, but if you recognize any programs you don't need on a daily basis (e.g., iTunes or Spotify) click each entry and select Disable.

» Once you've finished the CCleaner process, it's a good idea to reboot your PC. If CCleaner has done its job, your PC should be noticeably swifter, but if you do encounter any errors, simply return to the Startup menu and reactivate all disabled programs.

» Congratulations! You now know how to install CCleaner and use it to optimize your PC or laptop. It's a good idea to run it every now and then to keep on top of the files Windows is so keen on depositing everywhere—you can even run it on the computers of friends and family, too. With the help of CCleaner, you can keep even the oldest of PCs running like new. ☺



Convert Video Files with VLC

YOU'LL NEED THIS

VLC MEDIA PLAYER

An incredibly versatile media player that should be on every PC. Get it at www.videolan.org.

VLC MEDIA PLAYER is often called the “Swiss army knife of video players” because it gives you such precise control of nearly every aspect of video playback.

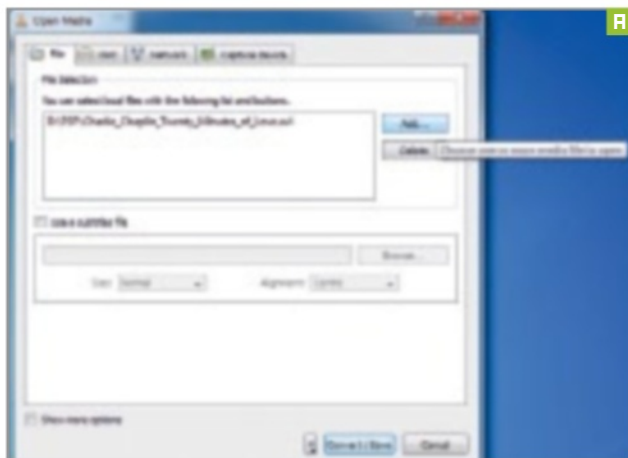
For example, you can change the speed of subtitles, tell the audio to play a bit behind the video to compensate for syncing problems, or change the brightness and contrast. But it's not just a great media player, it's also equipped with everything you need to convert video files to other formats.

Because VLC is open-source software, it's been added to and improved upon by a community of skilled and passionate programmers. You'll also find an array of skins and extensions that will ensure that you want to keep using it long-term. In this tutorial, we'll walk you through some of its main features. —BOB ADAMS

1 LOAD MEDIA WITH VLC Install VLC media player after downloading it from the official site (www.videolan.org/vlc). It's a highly streamlined video player, so if you want a more snazzy look, try installing one of the many skins available from Videolan.org. Choose the Skins link and follow the instructions to get one that you like.

» When you're ready to convert a video file, click Media from the top menu and select Convert/Save. Then, in the Open Media window, click the Add button (image A) and browse to the location of the file you want to convert. When you're ready, click the Convert/Save button again. There's an option to add a subtitles file if you have one.

» Select the destination folder, give a filename, select the desired video profile, and click Start. By default, VLC media player comes with a few profiles that can convert your video to most of the widely used audio and video formats.



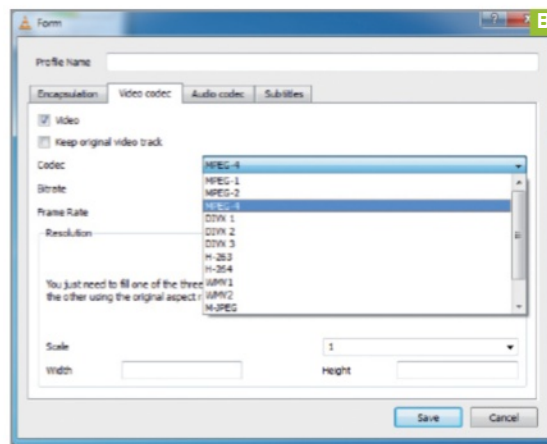
2 CREATE CUSTOM PROFILES You can edit, delete, or create new profiles using the three buttons next to the Select Profile drop-down list. Under the Encapsulation tab, select a file type to convert to (in this example, we're using MP4/MOV). Under the Video Codec tab, pick the MPEG4 codec (image B), choose a bitrate and frame rate, then click the Save button. You can define a particular ratio to export your converted file as—ideal if you don't like the format the film was in.

» You will need a bit of knowledge when choosing the best resolution for your output file, which depends on the destination device. Here, we want to play back on a tablet, utilizing full-screen mode. Enter the details in the Width and Height fields and your file will be forced into this ratio (it may crop the original).

» Hit Start to begin the conversion. The main VLC player bar will move along as the file is converted and downloaded. When complete, find the destination folder and double-click to play. You may have Windows Media Player set as your default player. If you want to use VLC, right-click the file, then choose “Open with > VLC media player.”

» To add a watermark when converting a video (typically a home movie), all you need to do is navigate to Tools > Effects and Filters. On the Video Effects tab, you need to click the Vout/Overlay sub-tab. Alternatively, you can add a logo on the next sub-tab (Logos)—you can even select the transparency, using the slider.

» We've converted the file and can play it back on our PC, but we chose a resolution suitable for a tablet. Transfer the converted file to your device. You can then play it with the your tablet's video player; if it doesn't support the codec, you may have to search the marketplace for a video player that will, such as VLC.



Send Commands to Your PC Remotely Using Twitter

YOU'LL NEED THIS TWEETMYPC

This free app is available at <http://tweetmypc.codeplex.com>.

TWITTER IS RIGHT up there with Facebook as one of the world's most popular social networks, but it has a power of its own that goes way beyond just tweeting for fun. The clever developers at CodePlex have managed to create a tiny-but-mighty application called TweetMyPC that allows you to control and access your computer from anywhere in the world by simply sending a tweet with a special command as its content.

You might be used to other kinds of software to remote control your personal computer, but with this tool you can make it even more simple and convenient—tweeting from a smartphone or tablet, for example. Unlike many other remote access programs, such as VNC, an IP address isn't needed. —CHRISTIAN HALL

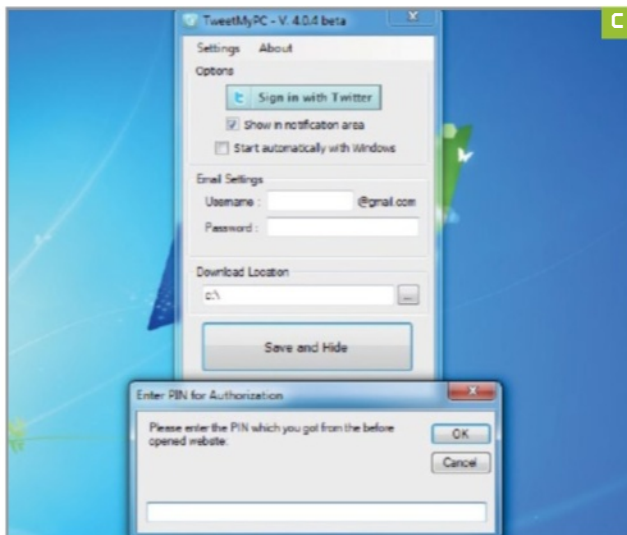
1 CONFIGURE TWEETMYPC To install TweetMyPC, go to <http://tweetmypc.codeplex.com>. Visit the Download section and download the latest TweetMyPC file. Download it and follow the installation instructions.

» You probably don't want to use TweetMyPC with your primary Twitter account, so go to www.twitter.com and create another account. Make your tweets private by going to Settings > Security and Privacy > Tweet Privacy and selecting "Protect my tweets." After you've finished creating and configuring the account, open up TweetMyPC from your desktop.

» The main window of TweetMyPC will now pop into existence—fill in the required data to link the program to your Twitter account. It's not necessary, but if you don't enter a username and password for a usable Gmail account, then useful commands such as **getprocesslist**, **getfile**, and **getfilelist** cannot be used in the app.

» When you click the "Sign in with Twitter" button at the top, your browser will be redirected to the Twitter site for authentication. Click Authorize and you'll then be shown a unique PIN that you'll need to enter on the pop-up that appears on your desktop (**image C**). Enter the PIN and hit OK. When you're done, click the "Save and Hide" button.

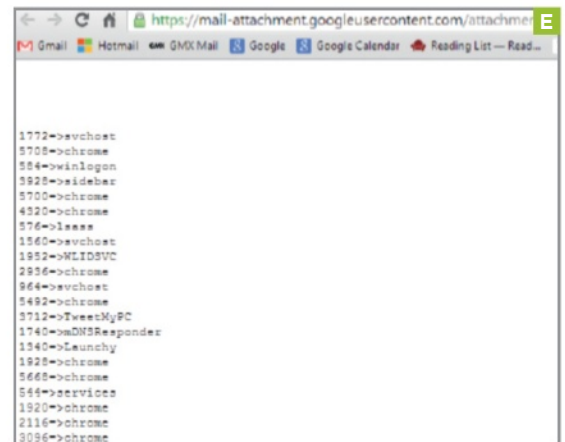
» When signing in, one of the options that appears is "Show in notification area," located just under the "Sign in with Twitter" button. It's selected by default so there's no need to change it. This is handy, as it'll add TweetMyPC to your Windows notification area. You'll get any TweetMyPC-related messages here, too.



2 TAKE CONTROL Now, it's time to tell your PC to do something with a simple tweet. From another device, use the Twitter account that's been linked to TweetMyPC to perform a command. Let's start with something simple, such as **ip**, which will display the IP address of your PC. The results will be shown as another tweet on your Twitter timeline (**image D**).

» Next, we can try **powerstate**, which is a useful tweet that will display the current power state of a PC. This also tells you the battery percentage of a laptop, as well as the online status. Now, try **getprocesslist** (Gmail users only), which will list all running programs on your PC. The results are then sent as an email, rather than a tweet (**image E**).

» And that's the basics—you can now control your PC with your Twitter account! You'll find a full list of commands at <http://bit.ly/d1Tzz6>. Some of these commands include the ability to shut down a PC by tweeting **shutdown**, or updating the wallpaper on your machine by simply tweeting **wallpaper** followed by a URL. Browsing through the list of commands is half the fun, so get started!



Download Films for Free

YOU'LL NEED THIS UTORRENT

Pick up the most popular BitTorrent client for free at www.utorrent.com.

YOU HEAR A LOT ABOUT illegal file-sharing and how “torrent” services are to blame, but it’s perfectly possible to use them without breaking a single law.

BitTorrent is a legal file-sharing service, and is one of the most efficient ways to get files from the Internet—you just have to know where to look. Whether you’re looking for books, music, or videos, there are hundreds of depositories filled with legal downloads for you to enjoy.

If you’re into classic movies, there’s no better place to start than www.publicdomaintorrents.info. This website hosts content that’s in the public domain—typically because the original copyright has expired—and is therefore free and legal for anyone to download. All movies on the site are AVI files encoded in DivX and most of them are around 600MB in size. So let’s get downloading!

—CHRISTIAN HALL

1 INSTALL UTORRENT The BitTorrent protocol is fast and efficient because it uses many computers (a “swarm”) to download lots of file fragments simultaneously. You’ll also need a piece of software called a client to assemble these fragments. BitTorrent has its own official client, but we like uTorrent (www.utorrent.com), as it’s so easy to use.

» You need to use your router’s admin panel to set up a firewall rule for uTorrent (**image F**), otherwise it might be blocked. You need to choose a port number (within a range defined by your router) and set the inbound and outbound status options to Allow. You’ll need to enter the primary and secondary DNS settings of your ISP in the appropriate fields, too.

» Some ISPs interfere with file sharing, which causes download speeds to slow. To avoid this, uTorrent has an encryption protocol to prevent ISPs from identifying BitTorrent traffic. Go to Options > Preferences > BitTorrent. Click Protocol Encryption and enable outgoing encryption, then check “Allow incoming legacy connections.”



2 TWEAK YOUR DOWNLOAD SETTINGS Click Preferences > Bandwidth to set limits for how your BitTorrent client behaves in a swarm. You can define a maximum download and upload rate and choose a maximum number of connections (**image G**). A higher number should mean a faster download, but too many can crash your router. Check online for more router information.

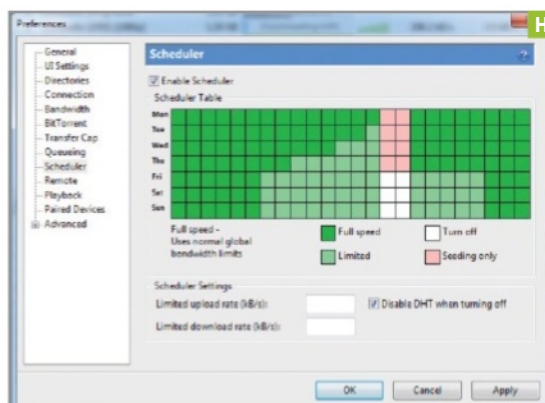
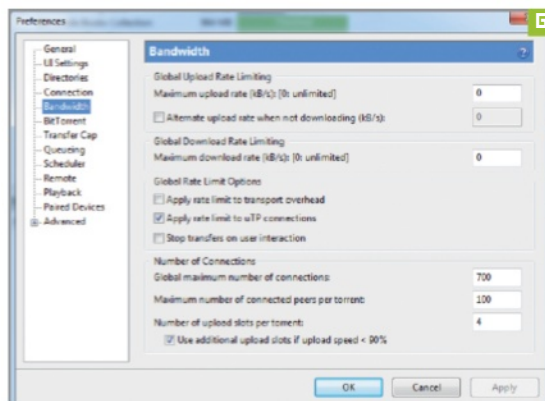
» If you get the downloading bug, you might want to set a download cap on your torrent client so that you don’t exceed the monthly download limit set by your ISP. This is easy in uTorrent—just click Preferences > Transfer Cap and enter a value (in gigabytes) that you’re comfortable with. You can change this setting at any time.

» If you want to set up your computer so that torrenting behaves in

a certain way at a certain time of day, try using the Scheduler option. You’ll see a green grid of time blocks that reflects that your uTorrent account is set to operate normally at all times (**image H**). Click each square to change this status to either Limited, Off, or Seeding Only.

» Now that you’ve familiarized yourself with uTorrent, you’re ready to grab a free film. Find something that interests you at www.publicdomaintorrents.info and click the link. Scroll down and choose a file format (we’ve chosen DivX AVI). Click the downloaded file to open it with uTorrent and click OK.

» You should find the file downloaded to your chosen destination on your hard drive. The torrent file will also be downloaded somewhere, but you can delete it. The files from Publicdomaintorrents.info are in AVI format and will play using a variety of media players, including Windows Media Player and VLC.



Edit Videos Online

YOU'LL NEED THIS

VIDEO CLIPS

All you'll need for this tutorial are some video clips to edit. Everything else takes place in your browser.

VIDEO EDITING isn't the quickest of tasks to do on your computer, and sometimes you just can't wait to get a video online for your friends and family to see. That's why YouTube has launched a video-editing tool that lets you tweak your movies online and then upload them straight to the video-sharing site.

The new YouTube Video Editor enables users to combine multiple existing pieces of footage to create a new, longer video. You can also trim the beginning or end of a clip to make it shorter, and cut out unwanted material. You can even use the editor to add soundtracks, and there's one-click publishing to YouTube so you don't need to spend time re-uploading the newly edited clip. Let's get started! —CHRISTIAN HALL

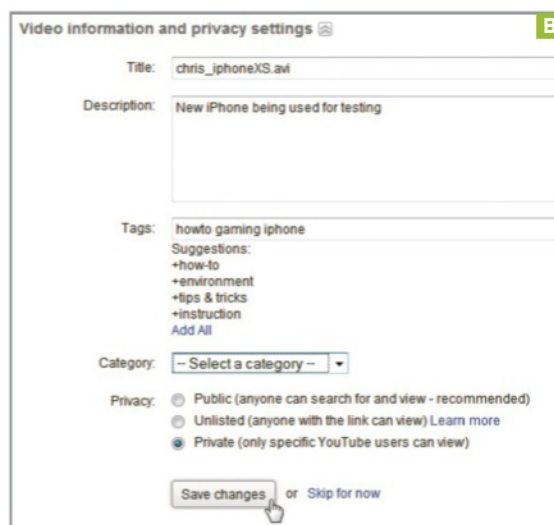
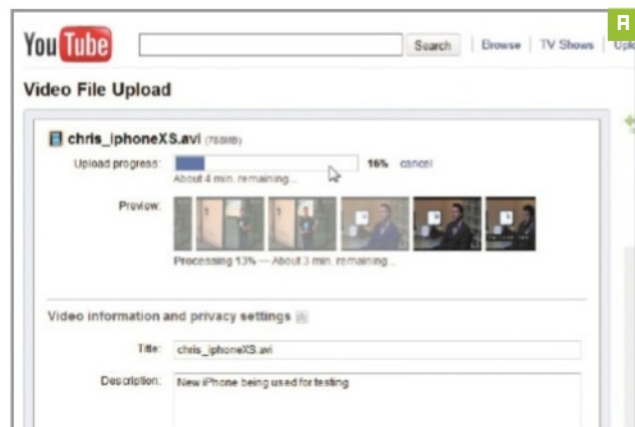
GETTING STARTED You need a YouTube account before you can edit your videos on the site. If you've already registered, just head over to www.youtube.com/editor and sign in with your username and password. If you don't have an account yet, go back to www.youtube.com and sign up first. Once you've logged in you'll notice that, like the rest of YouTube, the editor has a very clean look and is easy to navigate.

» Enter a title for the edited version of your video. Don't worry, this will not replace the original clips—the editor will create and publish a brand-new video ready for uploading at the end. First, though, we need to upload our clips.

» To get your videos onto YouTube so you can edit them, open up a new tab in your web browser and go to the upload page (www.youtube.com/my_videos_upload). Hit the Upload button and navigate to the video files on your computer, or drag-and-drop them onto the page from your desktop. The upload begins and you can view its progress at the top of the Upload window (**image A**).

» You're going to be uploading a few clips and combining them into a single video, so it's best to choose the Private option from the privacy settings so people don't accidentally stumble across your work in progress (**image B**). The default setting is Public. You can also tag the clips while uploading them, to make sure you group them together in an easily identifiable way.

» Once your clips have been uploaded successfully, go back to the Video Editor tab, refresh the page and you'll see your newly added videos all ready and waiting. Each clip is represented by a tiny thumbnail, and if you need to remind yourself of what each one contains, you can preview each one easily by clicking the Play icon that appears when you hover over it.



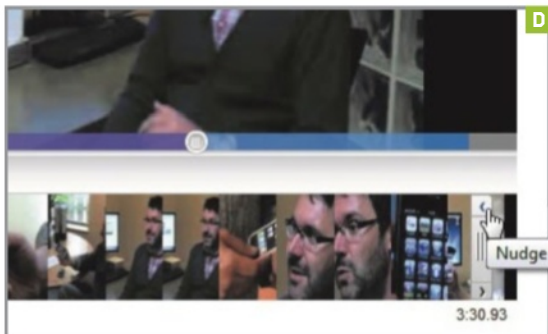
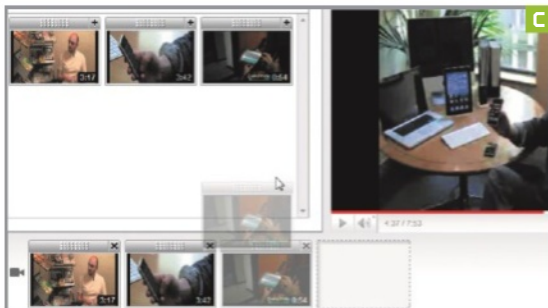
EDIT CLIPS To begin editing and combining your uploaded video clips to create a new movie, you need to drag and drop them to the storyboard at the bottom of the page. You can also click the "+" icon in the corner of each clip to add it to the storyboard. If you want to arrange your clips in a different order, simply drag-and-drop them around in the storyboard area (**image C**).

» Many of your clips probably contain portions of footage at the beginning and end that you can discard immediately. Move your mouse pointer over any of your clips on the storyboard and click the Cut icon that appears (it looks like a pair of scissors). This opens the edit window. To cut a clip down, simply drag the trimmer bar at either end and move it to the appropriate place.

» When you're cutting your clips, you'll notice that there are arrows above and below the line of the trimmer tool. You can use these to nudge your video along frame by frame, and fine-tune your cuts so they're just right. Click the arrows to nudge a frame either forward or back (**image D**). You can do this on the trimmer line at either the start or end of the timeline.

» While you're editing one of your clips with the trimmer, you'll see a real-time preview of it above. To play your newly edited clip in full, click the Play button. When you've finished editing bits out and you're satisfied that you've got it just right, choose Save on the bottom-left of the panel and your clip will be returned to the storyboard in its freshly edited form.

» If you click the Play button on the main window on the right-hand side of the editor, the clips in the storyboard will be played seamlessly one after the other to show you what your complete movie will look like. You can use this to preview the video at any stage, but it's likely you'll have to do a little more editing on each clip first to get the results you want.



3 APPLY FINISHING TOUCHES When you've cut down video segments and pieced them together to make a longer movie, the results might look great, but you'll probably end up with discordant sections of audio. With the YouTube Video Uploader, you can add a new soundtrack in a flash. Select the Audio tab and you're shown over 500 audio snippets to choose from. Use the search bar above to find music you want.

» If you want to hear a preview of an audio track before you add it to your movie, simply hit the Play icon that appears to the right of the track when you hover your mouse over it (image E). If you find a piece of audio you like, click and drag it to the audio area of the storyboard (just below your collection of video clips) or press the "+" icon to add the track to your movie.

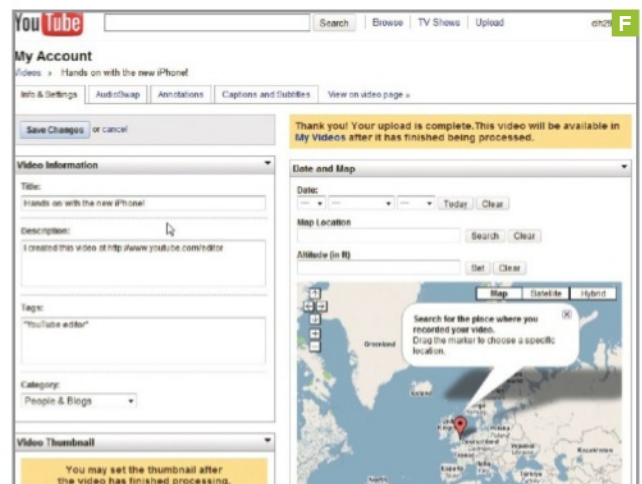
» To finish off your YouTube video, you need to arrange your clips into the right sequence. You can re-order the clips at any time in the storyboard just by dragging and moving them into a different order. Bear in mind that the

finished movie needs to be less than 10 minutes in length before you can save it and upload it to YouTube, so it pays to be quite selective with your editing.

» When you're satisfied that your movie looks and sounds as good as it can, click the Publish button to begin the upload. You'll see a new screen where you can edit some details, including the title and any tags you want to add. You can also geotag the video using the map on the right-hand side of the page (image F). Simply choose a date, time, and location, then click Save.

» The Publish screen also has a field labelled Broadcasting and Sharing Options. This is where you can change your video's privacy settings (either Public or Private) and invite contacts to watch it directly by sending them a message. When you do this, you'll be presented with a window where you can write a short message explaining your video invitation.

» Congratulations! You've just made your first YouTube-edited video and uploaded it for the world (or just your friends) to watch and admire. Your YouTube contacts should be able to view it, and they can also press the Like button to give their seal of approval. If you make a video public, you can also use the Like button to gauge how well your video has been received.



Log into Your PC with Facial Recognition

YOU'LL NEED THIS

A WEBCAM

Facial recognition won't work if your computer can't see you!

KEYLEMON

The free version of this security app is available at www.keylemon.com/product.

WHEN YOU'RE USING a shared computer, or a laptop that could be easily stolen, it's important that your Windows user account is protected by a password to prevent anyone else logging on and accessing your personal data. Having to type in your password every time you log on to your PC can be a pain though, and it can be tempting to leave your account unprotected.

That's where KeyLemon comes in. This clever biometric tool uses your webcam to scan your face each time you log into Windows. Once you've been identified, you're logged straight into Windows without having to touch your keyboard. The process is fast and completely automatic.

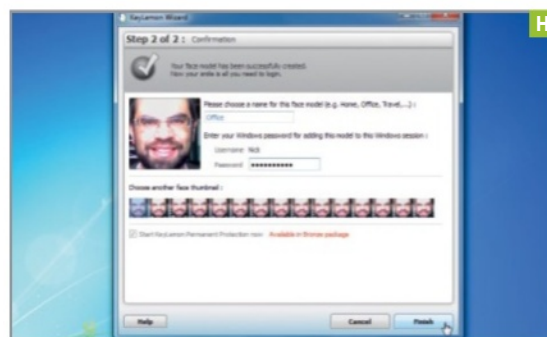
The software is incredibly simple to set up and use, and the free version of KeyLemon has all the features you need to keep your data safe. —NICK PEERS

1 SET UP KEYLEMON First, download and install KeyLemon from www.keylemon.com/product. The setup process is straightforward—just make sure that “Run KeyLemon and create my face model now” is checked before clicking Finish. The KeyLemon Wizard will launch, your webcam should switch itself on, and you'll see yourself on screen, ready to create the face model that KeyLemon will use to log you into Windows.

» You'll notice that a head-and-shoulders frame is overlaid on top of the window (**image G**); try to position yourself or adjust your webcam so you fit within the frame. Once you're in the correct position (a green check on the picture will indicate that KeyLemon is happy with your choice), click the “Create a new face model” button that appears and keep still while the model is created.

» Use the vertical bar to the left of the preview window to check if your face has been captured accurately. The bar should remain green unless you change your position or move your head. If the bar remains red and you're prompted to adapt the photo, do so. Otherwise, click Next Step.

» Next, type a name for your face and choose a thumbnail image to be associated with it (**image H**). The free version of KeyLemon only allows you to store details for one face per user account, so this step isn't important. Pick a thumbnail, enter your password and click Finish.



2 TEST AND FINE TUNE Test your login by clicking Start > Log off. You'll see that the Windows Welcome screen has changed slightly (**image I**). If your face is within range of the webcam, KeyLemon should recognize it and log you into your user account. If it doesn't work, log in with your password, then repeat step 1 (post-installation) again.

» Fine-tune your settings via the KeyLemon Control Center desktop shortcut (or search for it in the Start screen). Many options and settings are restricted to paid-for upgrades, but the core functions are free. If you're unhappy with your model choice, choose another facial shot by clicking Wizard under the General tab, or select Profile to rename or tweak your current model.

» The free version of KeyLemon also comes with a plugin called LemonDay, accessible from the Plugins tab. When enabled, it records up to five photos a day when you log into your PC (you can add your own, too). You can then watch your face change over time via a movie slideshow, which can be shared with others. It's not practical, but your friends might find it amusing! ☺



Investigate and Improve Your System's Reliability

YOU'LL NEED THIS

WINDOWS VISTA OR LATER

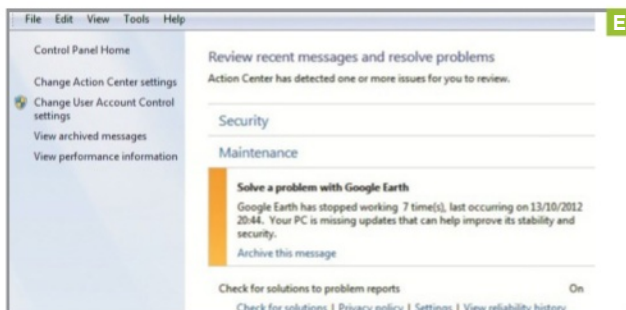
No additional software is needed for this how-to—the Windows Reliability Reporter is built into all versions of Windows, starting with Vista.

MODERN WINDOWS is fast and reliable, but it's not perfect. Programs and services can still silently crash in the background and bring the whole thing to a halt, losing work and data. The problem is, if we don't know about these internal problems, we'll always be at their mercy. In Windows Vista and later, however, there's built-in help, in the form of the Windows Reliability Monitor. This little-known utility has saved us more than once from an unstable system, and it can do the same for you by pinpointing exactly what's gone wrong. It also gives you peace of mind that malware isn't the cause of your issues. —JON THOMPSON

1 OPEN WINDOWS 7 PERFORMANCE MONITOR The Windows 7 Performance Monitor is buried within the depths of the Control Panel. To open it, first open the control panel from the Start button. Once running, click the System and Security section. Within that, click the Action Center, then expand the Maintenance section that appears. Here you'll find the option to view your PC's reliability (in Windows 8 just search for it).

» Click "View reliability history" (**image E**). This creates a report using the reliability data Windows 7 has stored. The report takes a minute or so to compile and display. Toward the top you'll see a graph that gives a simple indication of your computer's overall reliability. Under that is a chart of the different kinds of problems that are keeping your PC from scoring a perfect 10.

» To get a fuller overview of system reliability, click the Weeks option at the top of the screen. You can scroll back and forth over the weeks with the left and right arrow keys. To drill down into the data, press Enter and a list of all the system problems for the day or week appears in the lower pane (**image F**).



2 INVESTIGATE PERFORMANCE ISSUES Critical events are ones that cause internal failures or complete operating system crashes. They're listed in the top three Failure lines of the data table under the graph. Click the weeks when these occurred to learn more. Double-click an entry to see the technical details.

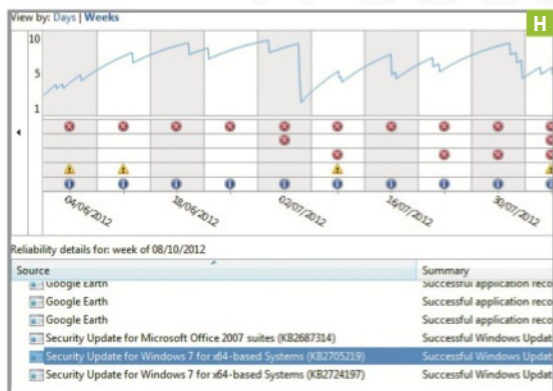
» Windows can help solve issues by accessing its online database of previous problems. To seek out a possible answer, click "Check for a solution" in the Action column of the relevant entry in the lower pane. There's no guarantee Windows can put things right itself, but it's worth a try.

» In order to keep your computer safe and secure, it's essential that your installation of Windows is updated with the latest patches. This should happen without any input from you, but if the automatic update process fails, you usually don't find out about it. Click the weeks that are highlighted with a yellow warning triangle, then look in the lower pane (**image G**). Are there any Failed Windows Update entries? If so, make a note reminding yourself to update Windows manually later. It will take too long to do right now.

» It's highly likely that as you step back through the reliability history you'll find certain drivers that keep crashing. Sometimes these crashes can cause system instability. This can also happen with browser plugins—Adobe Flash Player is a particular favorite. If you haven't updated such software recently, add it to your list of potential updates for later.

» Select an entry where there are blue "i" symbols in the data (**image H**). As well as telling you about failures and warnings, Windows Reliability Monitor also tells you about things that have gone well. You can see how the system and applications have been updated automatically. In many cases, these updates happen silently, so this is the only notification you have that they succeeded.



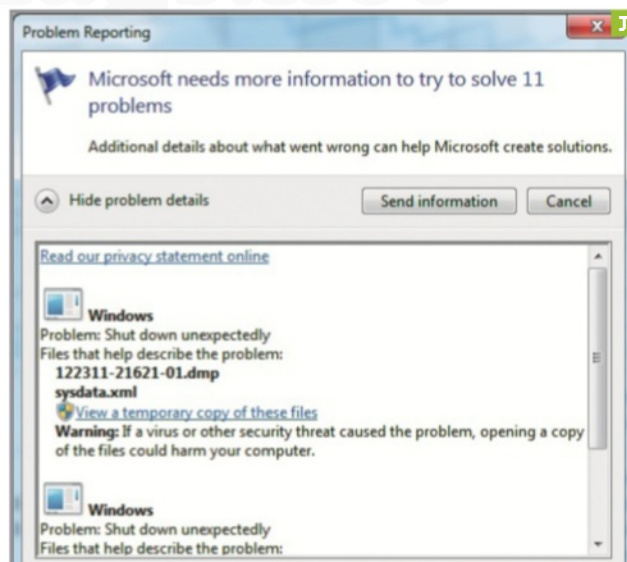


3 VIEW ALL PROBLEM REPORTS At the bottom of the screen, you'll find the option to view all problem reports. This produces a long list of all the problems the operating system and installed software have encountered (image I). You can sort this list by clicking a column title. You might find that an anonymous report has been sent to Microsoft to help the programmers concerned with system stability.

» In the list of problem reports, you'll see solutions listed for certain applications and drivers. Find one and right-click it, then select "View solution." Windows Reliability Monitor accesses what's known about the problem. It might provide instructions for you to follow, or it might give you a link that will let you download a more recent version of the application.

» If you just want to see if there are any available solutions to the collection of problems your computer has encountered to date, go to the main Reliability Monitor screen and click "Check for solutions to all problems." Windows may need to send anonymous information to Microsoft to get solutions (image J). If this is the case, click "Send information" to receive any available answers.

» When a program fails, Windows automatically starts looking for a solution, but this isn't always appropriate. Click the back button in Reliability Monitor and open the Maintenance section. Click Settings to set the default behavior when a program crashes. It's best to check for solutions as you go, but you can have Windows ask you what to do when something crashes (image K).



Choose when to check for solutions to problem reports

When you send problem reports to Microsoft, you will receive solutions when they are available. You can adjust how much information is sent.
What information is sent?

- ☒ Automatically check for solutions (recommended)
- ☐ Automatically check for solutions and send additional report data, if needed
- ☐ Each time a problem occurs, ask me before checking for solutions
- ☐ Never check for solutions (not recommended)

[Change report settings for all users](#)
[Select programs to exclude from reporting](#)
[Read the Windows Error Reporting privacy statement online](#)

Review problem reports

View problem reports that can be reported to Microsoft. When solutions are available, they will appear in Action Center.

Source	Summary	Date	Status
More			
Driver software installation (39)			
Driver software installation	Could not install driver software	22/07/2010 20:13	Report sent
Driver software installation	Could not install driver software	02/04/2011 23:11	Report sent
More			
Electronics Assistant			
Electronics Assistant	Stopped responding and was closed	04/08/2011 11:32	Report sent
emulator-arm.exe (8)			
emulator-arm.exe	Stopped responding and was closed	08/06/2012 23:30	Report sent
emulator-arm.exe	Stopped working	11/08/2012 04:26	Report sent
More			
file-svg.exe (10)			
file-svg.exe	Stopped working	16/08/2011 16:33	Report sent
file-svg.exe	Stopped working	08/09/2011 19:09	Report sent
More			

4 UPDATE WINDOWS MANUALLY Finally, if you need to update Windows, it's time to do so. Click the back button at the top-left of the screen, then click Windows Update at the bottom-left. Click Install Updates. You may have to reboot when this is complete. Check with Reliability Monitor regularly to see if there have been any failures—especially with Windows updates—to keep your PC healthy. ⏻

THE LIST

8 DYING TECHNOLOGIES YOUTHS DON'T USE

8

LAND LINES

Nobody wants to pay for two phone contracts or sit on the couch to talk.



7

COMPACT CAMERA

There's no reason to carry one of these instead of a smart-phone, and phones are higher-res.

6

CDS

Vinyl records are making a comeback, but the 30-year-old compact disc isn't and never will.



5

ALARM CLOCK

Once again, the smartphone has claimed another victim—the snooze button.



4

ANSWERING MACHINE

We're not sure if youths actually call anymore, let alone leave voicemails.



3

WIRED INTERNET

We'll never give up our LAN cables, but these damned kids are all about wireless now.

2

GPS DEVICE

Smartphones now handle GPS duties, rendering the dashboard-mounted box obsolete.



1

MAPS

Our parents still use them, but today's youth will never unfold one of these in the car.



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